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KENNETH B. LEWIS

WHAT IS AHEAD IN WIRE DRAWING

An Interview with Kenneth B. Lewis
by W. W. Macon

A NOTEWORTHY contribution to the literature of wire drawing is this interview with Kenneth B. Lewis. It is a look into the near and far future. It carries with it implications of improvements in practice that are calculated to better the product and reduce its cost, all to the end of widening the field of wire applications.

The common wire rod may be over half again larger in diameter than the present one; the handling of heavier bundles will follow; mechanical handling will become general; present-day pickling and the subsequent baking may both be discontinued; a revolution portends in galvanizing, and marked changes in die design are likely. But there is a great need of much technical research. The interview is in part a call to the American industry to support such research.

WHAT of the future of the wire industry? Will there be many new uses found for wire and wire products? Will there be changes in present-day processes that are calculated to widen the market? Will there be improvements irrespective of a widening market?

There are two parts to the main question: the commercial and the technical. Certainly wire production, at least steel wire, has not expanded in the same ratio as other forms of steel, for the records of the past decade or so have shown that while the per capita consumption of wire has been increasing, the rate of increase is not up to that of steel in general.

As to expecting marked progress technically, the question was put to Kenneth B. Lewis, who is acknowl-

edged as an expert of the first rank in wire manufacturing. He consented to give some answers, which are here set down. They present possibilities that may affect profoundly the economic and commercial position of the wire industry.

The authority with which Mr. Lewis speaks is based in part on the fact that since 1909 he has been concerned with the manufacture and sale of wire mill equipment for the Morgan Construction Co. of Worcester, Mass. Preceded by an engineering education at Harvard College, three years with the Bethlehem Steel Co., where he became assistant superintendent of the open-hearth department, and two years with the American Steel & Wire Co., at Worcester, as research engineer, he has devoted himself almost exclusively to

the wire business. Fortified by trips abroad to the wire centers of Europe and with a penchant for historical as well as technical research, he has probably given more thought than any one else in this country to what we may have in store. As he himself expresses it, "The only sound basis on which to judge the future is the past."

Wire Rods Half Again Larger Than Present Size

POSSIBLY the most portentous change that Mr. Lewis thinks may come is the general use of a larger wire rod. The No. 5 rod, 0.207 in. in diameter, was selected many years ago as the point where the line was most economically drawn between hot rolling and cold drawing. This choice was predicated on

the then existing balance among power and labor costs, unit weights, die life, and other factors which have in recent years been profoundly modified. Now that the scope of continuous drawing has been extended, possibly a rod as large as 5/16 in. (0.3125 in.) in diameter may become the common starting point in drawing.

As Mr. Lewis puts it: "About half the output of the common products mill is one and two-draft wire from No. 5 rod. From a 5/16-in. rod this would be three and four-draft wire. In single-hole practice, the labor cost varies almost directly with the number of drafts. In continuous drawing, on the other hand, the number of drafts is of little consequence. The cost varies almost directly with the weight of the bundle."

Might Help the Nail Market

"Wire from No. 6 to No. 9 $\frac{1}{2}$ gage," he continued, "if three and four-holed from a coarse rod, would be stiffer and might, by permitting the use of smaller diameters, put some life into the nail market. A keg of nails of a certain length would contain 60 to 70 per cent more nails by count."

"As for galvanizing, three and four-draft wire," he said, "would be cleaner and easier to cover. And as a raw material, the coarse rod would be more satisfactory. It would be easier and cheaper to clean, coat and bake, would take less acid and lime, be less susceptible to acid brittleness, and would run better off the flipper. It would take more power to draw, but less to roll. Bundles could be of double weight out of the same length of billet."

"Wire drawing labor costs would be about the same, the cost of extra drafts being balanced by savings due to larger bundles. Total power cost including both rod and wire mill

would be greater but a big labor saving could be picked up in the rod mill where the same crew rolling a double section would turn out double the normal tonnage. A net saving of \$1 to \$1.50 a ton might be expected of the consolidated rod and wire mill practice. No. 5 rod might continue to be rolled for small gages of wire."

Heavier Wire Rod Bundles a Certainty

"In short," said Mr. Lewis, "the whole technique that has grown up around the No. 5 rod may have to be recast around another gage. At any rate we are certain to handle heavier bundles. In 1830, according to Deacon Washburn, in his autobiography,

the daily output of a man on coarse wire was 50 lb.; today it is close to 20,000 lb., a 400-fold increase in 100 years. It is significant that the unit length of the wire rod has increased in the same period just 400 fold.

"Another significant thing," says Mr. Lewis, "is the growing interest in butt welding of rods for non-stop drawing on continuous wire machines. There is evidence that the Germans, the French and the Belgians are getting the jump on us in this development, which is the more humiliating for the fact that not only the idea but the very machines and welders and the dry drawing practice itself are American in origin."

Advances Will Occur First in Design of Dies

If there is to be a saving in power and a heavier drafting of the wire, Mr. Lewis would look for it to come through some means by which the friction between wire and die can be reduced. He admits that steel of improved quality, free, for example, of segregation and solid non-metallic inclusions, might allow for larger cone angles in the die and thus for a larger percentage of the die pull to go into actual deformation of the metal. He states, however, that the results of recent researches are consistent with the view that beyond a certain point changes in die angle to decrease total friction are accompanied by an increase in the mean yield point of the metal in radial compression of such an order that one practically balances the other.

A sounder, cleaner steel would, however, in Mr. Lewis's opinion, permit of heavier drafts. "We are stressing the metal in the cone to its yield point in compression. The horizontal component of these radial compressive stresses, added to the frictional drag, must be exceeded by

the tensile yield point of the finishing wire if drawing is to proceed. A flaw in the metal does not as a rule lower the yield point in compression, but it does in tension. Such a flaw will pass readily through the cone, but when it has to take up the burden of pulling subsequent metal through the die, it fails. We have to leave a substantial margin of safety for these flaws, and if they could be eliminated we could sail a little closer to the wind in laying out our drafting schedules."

Prophecy regarding dies is that within a few years "dies will be so far in advance of other details of the wire-making process that the die makers will have to sit down and wait for us to catch up with them." And at this point, Mr. Lewis delivered himself of a plea he has made at more than one engineering meeting, namely, that something be done to analyze the forces operating in a die, separating die pull into its component parts, that is, die friction and deforming force.

He has long sought for the for-





mulation of theories so that experiments may be planned along lines where success will count most. "Much patient work," he said, "is being done in the laboratories of England and Scotland, with which are associated the names of Longmuir, Adam, Brown, Thompson, Francis, Alkins, Desch, Bonn, Horsburgh and others. France and Germany are contributing to a discussion to which America not only fails to contribute but of which she fails even to take cognizance."

Tungsten Carbide Dies

Passing over briefly the matter of chilled iron dies, which Mr. Lewis urges are a good deal better than is generally supposed, and also tempered steel dies, which he credits with proving satisfactory when there has been the spirit to accept them, he dwelt a moment on tungsten carbide dies. He asserts there is no practical limit on the amount of wire that can be drawn in one threading. Yet he believes the tungsten carbide die is susceptible to improvement just as the tungsten filament for the electric light was changed from a delicate, fragile thing to one of notable toughness. As it is, these dies, he emphasizes, have a lower coefficient of friction than steel or cast iron and "they may be further improved by a higher polish, or a denser structure, again permitting heavier drafts.

"The factors limiting reduction are the yield point of the metal, the cotangent of the angle, and the coefficient of friction. The angle is of immense importance, but tampering with it for this purpose will, beyond a definite limit, defeat its object. The coefficient of friction, however,

can be attacked with impunity. Every gain here will be net gain. Its importance will be apparent when one reflects that from 25 to 85 per cent of die pull is wasted in friction.

Tremendous Pressures Developed

"It is certain that after the invention of the die the greatest advance in the art was the discovery of a treatment whereby an unctuous substance could be bonded to iron wire so strongly as to persist as a substantial non-metallic film between die and wire. Friction was at once reduced to one-fifth the previous value, and the possible severity of drafting increased in about the same ratio.

"It must be remembered," said Mr. Lewis, "in extenuation of the seeming backwardness of the wire industry in this matter, that we are dealing with a bearing problem which would turn the hair of a power expert gray overnight. While the power and lubricating experts deal with pressures rising to 4000 or 5000 lb. per sq. in., our pressures begin at about 70,000 and run to 350,000 lb. Anything in the nature of fluid friction is out of the question; our problem relates to rigid films keyed to one of the co-acting surfaces and in our calculations the laws of unlubricated friction must be used.

"The weakness of our film lies in the fact that it thins out and disappears before the steel has had its full quota of cold work. Not only does it fall away on account of faulty bonding, but the mere change in wire size impairs it, since a reduction to one-half the original diameter means that the wire now presents twice the

initial surface, which must be covered by the original film. The film bonded to the rod must carry on practically unaided, for it is very doubtful whether it picks up any help after the first draft. If only we could develop a film to which we could add as occasion arose, as do the European wire-drawers, our rejections would be cut enormously."

European Practice in Meeting Die Friction

Mr. Lewis referred here to the current European practice of coating rods by dipping in a solution of copper sulphate. The copper film so produced can be renewed by another dip whenever it shows signs of failure, and low carbon wire can be drawn an incredible number of drafts without failure. The copper film, however, makes direct contact with the die, and the frictional coefficient of the co-acting surfaces, he states, is more than double that of our practice, and light drafts, low speeds, and small unit weights are the penalties that must be paid for its use. The further fact that the leading European mills are adopting the American system seems to dispose of the copper film as a possibility.

Changes in Cleaning Wire Probable

CHANGES in the cleaning house of the wire mill we shall probably see, in the opinion of Mr. Lewis. We are trying to remove iron oxide from steel by a reagent, such as sulphuric acid, which does not act on the oxide, but does go to destroy the steel. The inhibitors in use are doing good work, he agreed; they ap-

(Concluded on advertising page 24)

ELECTRIC EQUIPMENT FOR MACHINE SH

By H. H. VERNON

Industrial Engineering Department,
General Electric Co., Schenectady, N. Y.

THE well equipped machine shop has tools of all descriptions, and not the least useful among them is the small hoist. Small hoists are used to serve lathes, shapers, planers, boring mills, etc., and may be driven by manual, air, liquid or electric power. The following discussion deals with motors, brakes and control for the electric type.

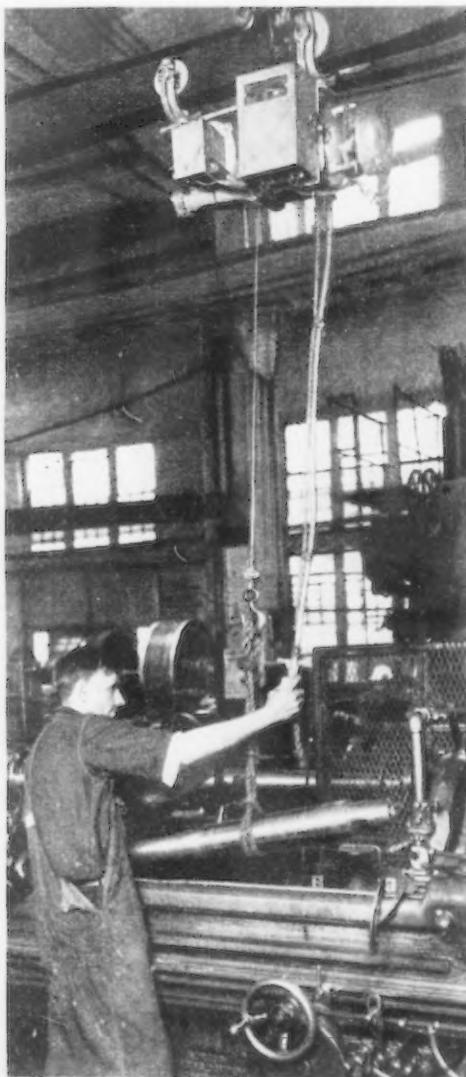
The squirrel-cage, three-phase, in-

closed, alternating-current motor is commonly used to drive such hoists because it is strong, reliable and comparatively inexpensive, but single-phase, alternating and direct-current motors are used where the power supply requires them. As a rule, a single-speed, squirrel-cage rotor motor will provide the operation desired because of the slow hook speed for which it is geared; therefore, a full-voltage starter type of control may

be used. If some speed control is desired, it can be obtained by using one or more steps of primary resistance. (Chart 1.)

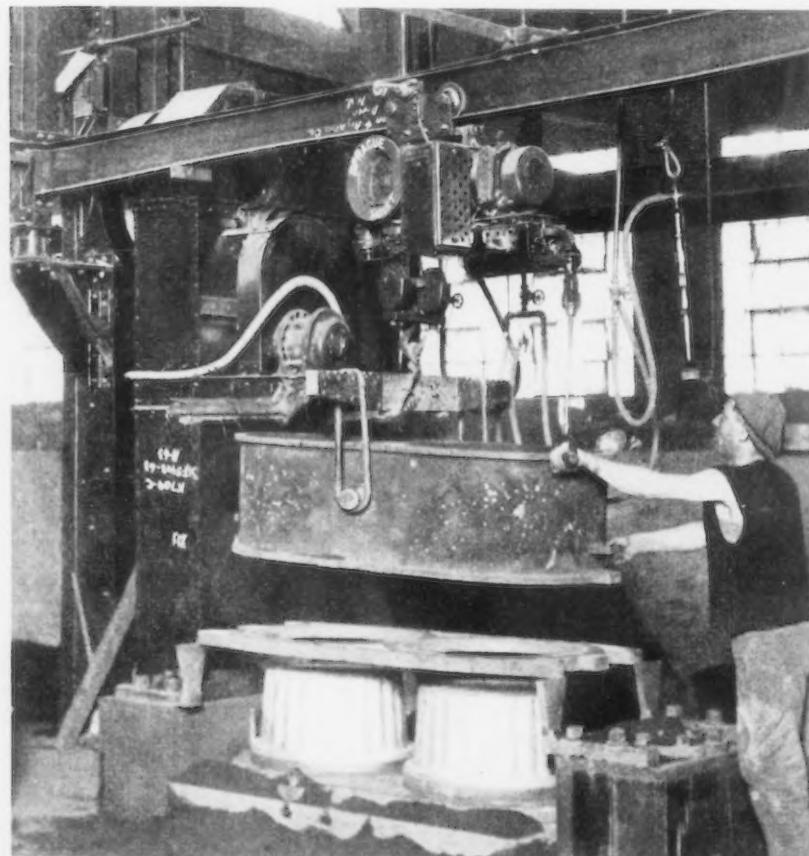
It will be noted that inserting resistance in the primary circuit of the motor lowers the voltage applied to the motor terminals and this lowers the torque and the speed.

The speed of the squirrel-cage rotor motor is practically constant for all loads when connected to the line with-



THIS push button control (at left) permits operation of the hoist with one hand, leaving the other free to guide the shaft.

IN this drum-controlled hoist installation, the control is through the pendant rod. The operator has one hand free at all times to guide the load. (Below.)



SHOP HOISTS



SUCCESS, in the metal-working industry, as in many other industries, is dependent upon attention to details. This applies with considerable force to an understanding of the too often "taken for granted" items of small equipment.

The small hoist, a useful but often overlooked adjunct of production in our machine shops, falls into this category. In this article, the author gives us a comprehensive picture of motorization and control of small hoists, particularly adapted to machine shop service.

out resistance and may be used with hoists that are not equipped with a low-efficiency worm gear or an automatic mechanical load brake, without danger of overspeeding when lowering loads. On the other hand, a series-wound, direct-current motor has a varying speed characteristic, as shown in Chart 2. With this type of motor, the hoist must have an inefficient worm gear or an automatic mechanical load brake; otherwise, the

motor will overspeed in the lowering direction when the load tends to over-haul the motor or if the friction of the hoist does not maintain a safe load on the motor.

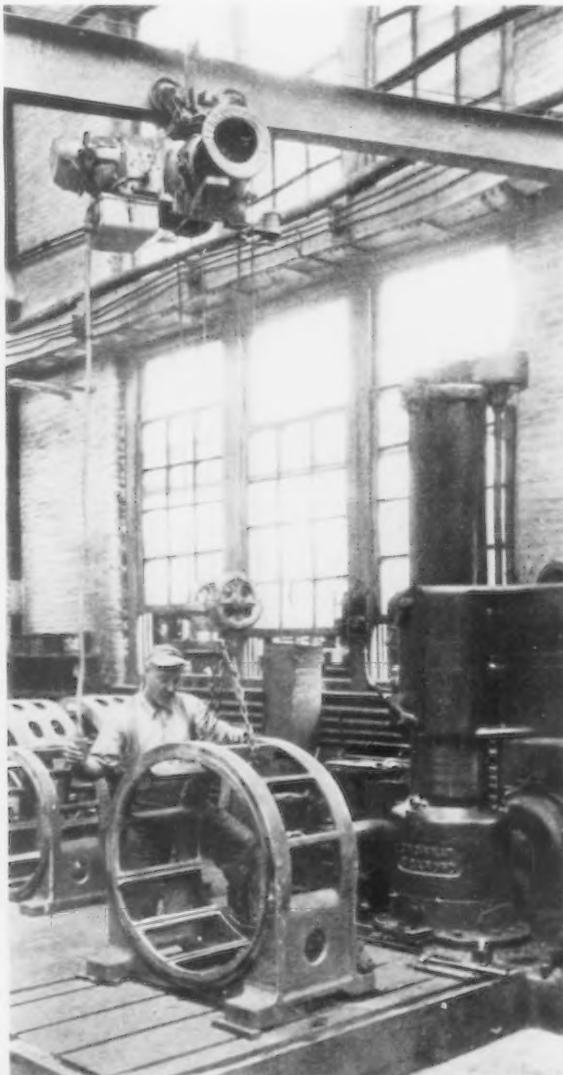
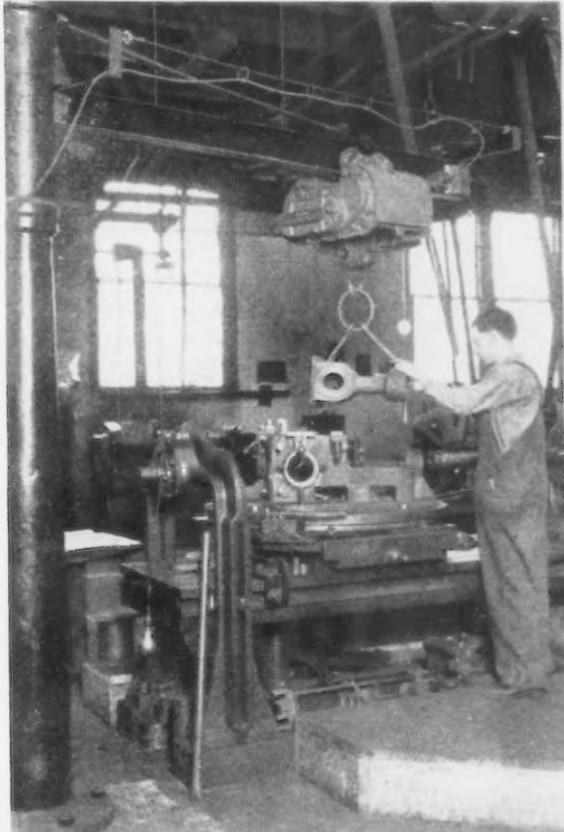
Some hoist applications require a speed slower than the normal or rated speed and this can be obtained with the squirrel-cage motor by inserting primary resistance, and with the direct-current series motor by inserting some resistance in series

with the motor and a block of resistance in parallel with the motor armature. This latter connection provides a low speed and the speed changes very little with a change in load. Furthermore, dynamic braking is obtained if the motor is overhauled by the load.

Small hoists must have some kind of brake to hold the load suspended in the air, and a friction brake mechanically or magnetically op-

THE hoist is moved (at right) on the I-beam by means of a small steel cable in parallel with the conduit between the push button and the contactor panel.

NOTE the isolated pillar jib and method of supporting the flexible power cable in this hoist installation. (Below.)



erated is used for this purpose. Some hoists are equipped with an automatic mechanical load brake which is a friction device of some description to put an artificial load on the motor when lowering the hoist hook, and as a rule such hoists use spur gearing between the motor and the hoist drum. Hoists that use worm gearing of comparatively low efficiency do not require an automatic mechanical load brake because the worm gear puts sufficient load on the motor in the lowering direction to prevent a series-wound motor from attaining an unsafe speed.

A commonly used automatic, mechanical load brake consists of one or more rotating disks that are pressed against stationary surfaces, and the friction between the two surfaces loads the motor. The construction of this brake is such that, in the hoisting direction, it acts as a coupling between the motor and the hoist drum, but, in the lowering direction, it acts as a brake. The change from coupling to brake and vice-versa is automatic and from this the name is derived.

Although an automatic mechanical

load brake will hold the load suspended, all hoists are equipped with mechanical or magnetic brakes on the motor shaft. The function of these brakes is to stop the motor armature quickly and hold the load suspended. A mechanical holding brake when used is released by the movement of the controller handle when the motor is energized, and the brake sets when the controller handle is returned to the "off" position. A magnetically operated brake is always used when the hoist has push-button control and quite frequently is used when there are hand controllers. The magnetic brake may be of the shoe, disk or hand type.

Shunt-wound brakes are standard for alternating current, and series-wound brakes for direct current. The coil of the direct current brake is connected in series with the motor and if for any reason the circuit is interrupted, the brake sets and stops the motor armature. The objection to a shunt-wound, direct-current

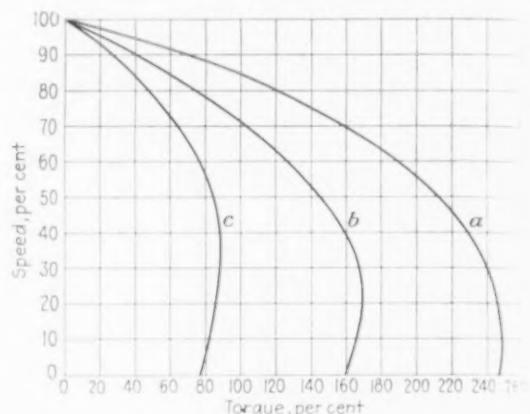
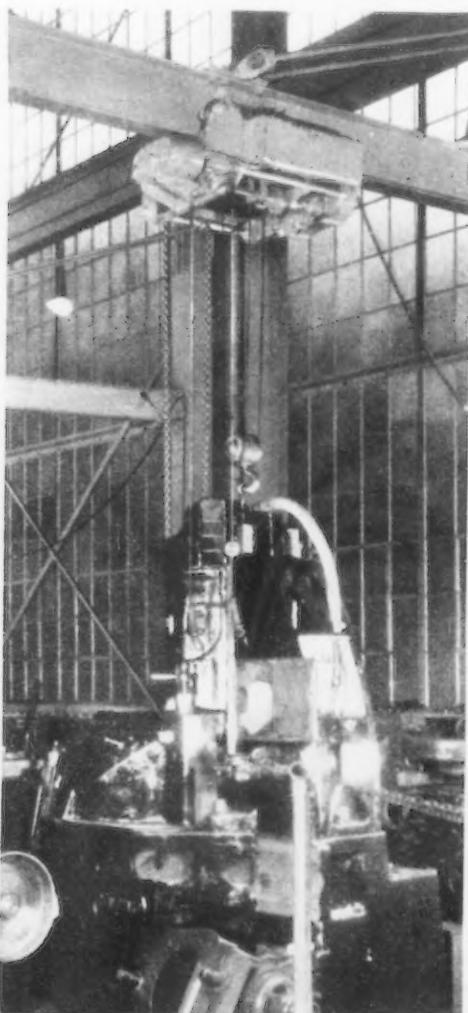


CHART 1: (Above) Torque-speed curves of high-resistance rotor, 3-phase, 60-cycle, 220-volt motor. Two speed points of control c and b.

CHART 2: (At Right) Torque-speed curves of a series wound, direct-current, small hoist motor.

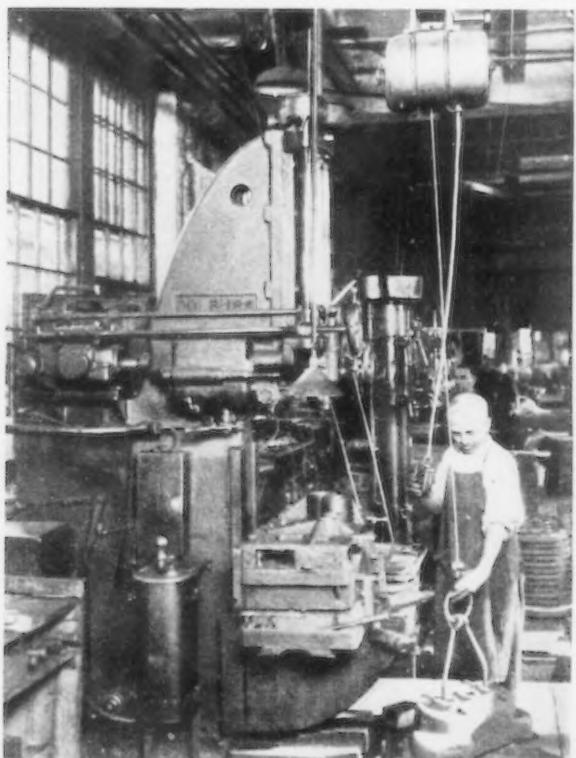
brake is that the motor circuit may be interrupted but the brake may be connected in such a way that it remains energized. Under this condition, the load may drift far enough to do some damage.

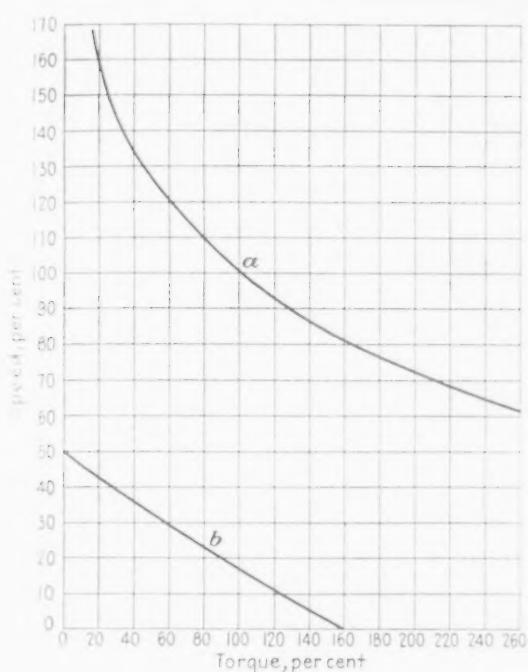
Full-voltage and resistance controls are used on small hoists and they may be either hand-operated drum switches



A WALL pillar jib furnishes the mounting for this small, machine shop utility hoist with drum switch control. (Left.)

In this push-button-control hoist installation, the operator can raise or lower the hook without taking his hand from the pendant push button. (Below.)





resistance, squirrel-cage, alternating-current motors and of series-wound, direct-current motors such as are obtained with full voltage starters. If some speed control is desired, resistance is inserted in series with the primary winding of the alternating-current motor on the first point of the control and a torque-speed curve such as (b) or (c) Chart 1 follows. To obtain a speed curve (b) Chart 2 for a direct-current motor, it is necessary to have resistance in series with the motor and resistance connected in parallel with the armature. The control provides this connection on the first point, and on the second point the resistance is cut out of the circuit and full voltage is applied to the motor.

Drum switches are operated by means of ropes and are spring centered; that is, if the switch is in the "on" position and the rope is released, the spring returns the switch

to the "off" position, the motor is de-energized and the brake sets.

When push-button-type control is used, the push buttons are of the momentary contact type suspended at the end of a control cable in convenient reach of the operator. The push button is depressed and held in that position while hoisting and lowering. As soon as the button is released, the motor and brake are de-energized and the hook is stopped. One of the advantages of the push button control is the ease with which the operator can either raise or lower the hoist hook with one hand, leaving the other hand free to guide the load and place it in his machine.

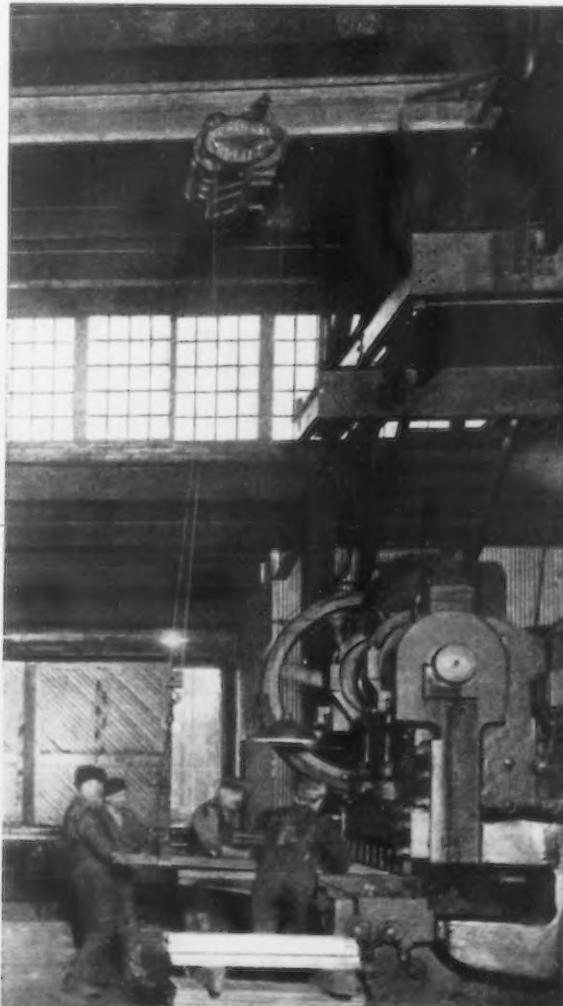
Small hoists, with capacities from 500 lb. up to 5 tons or larger, are available and their use in a machine shop greatly increases the efficiency of machine tools and their operators.



in push-button controlled contactors. With the former, no speed control is obtained because power is applied directly to the motor. Curves such as (a) Chart 1 and (a) Chart 2 are the fundamental curves of high-

A GOOD example of a modern hoist and monorail installation, designed to serve medium heavy machine production. (Below.)

A SMALL drum-switch-controlled hoist, serving shears. (At Right.)



CROOKED CORE MAKES STRAIGHT PIPE

By F. H. MOREHEAD
Chief Engineer,
Walworth Co., Boston

AT its Attalla, Ala., plant the Walworth Alabama Co. produces cast iron pipe which has the same dimensions as extra heavy wrought pipe. This cast iron pipe can be cut and threaded with the usual hand or power tools and can also be furnished with flanged ends. It can be beveled for welding or finished to receive any of the various types of couplings such as Victaulic and Dresser.

The pipe is cast horizontally in green sand molds with green sand cores. Its length as cast is 5 ft., but it is assembled into any practical length by acetylene or electric resistance welding.

The iron used is a low alloy of chromium and nickel. The addition of these alloys and the use of green sand molds and cores act together to produce a very dense structure possessing marked resistance to various corrosive influences. The pipe, therefore, is extensively used in many places where its resistance to corrosion is appreciated and where the ease with which it may be fabricated is an important factor. It is fur-

nished in sizes from $1\frac{1}{2}$ in. to 8 in.

The development of the technique used in casting the pipe uncovered some very interesting and puzzling problems. It is well known that all cores tend to rise or float in the molds when the molten iron enters. The force exerted on a long slender core is sufficient to bend it upward and make the top sides of the pipe thin. The bottom of the pipe is correspondingly thicker and the variation in thickness is therefore doubled when visually inspected. Pipe with thick and thin walls is not commercially acceptable. The use of chaplets could not be considered because of the air test to which the pipe is subjected and because of the service conditions for which it is intended.

Core-Making Machine Is of Conventional Type

The cores are made on the conventional type of machine which is used for soil pipe. Essentially this machine consists of an elevated hopper or sand bin with a riddle or shaker in the bottom of it. A funnel-shaped extension downward from the shaker guides the falling sand to the

core bar or arbor on which the core is to be formed. Support is provided for each end of the core bar which is located directly beneath the funnel.

With an arbor in place, the shaker is started and the falling sand strikes the arbor with sufficient force to adhere to it. The arbor is rotated and the sand continues to build up until the core is of proper size. Excess sand is sheared off by a knife mounted parallel to the arbor.

When the core is finished the shaker is stopped and one more revolution of the arbor removes the excess sand and the core is ready to set in the mold. The sand cut off by the knife is returned to the hopper by an elevator. No baking is necessary and no binder is used except the small percentage of clay in the sand and water. The drop from the shaker to the core bar is about 7 ft. The core resists the cutting action of the molten iron and is sufficiently open to permit the escape of gases from the inside of the pipe through vents provided in the arbor.

The diameter of these cores is held to extremely close limits without dif-

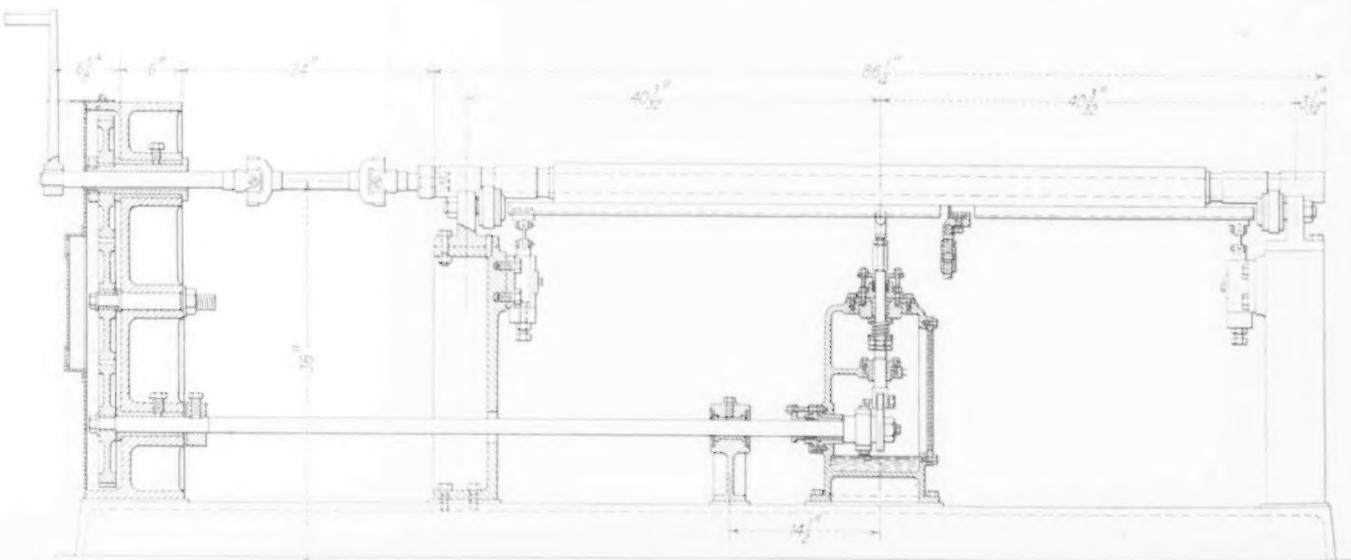


Fig. 1.—General details of machine for producing deflected cores. There is no change from a regular core machine except in the knife which forms the crooked core by means of a special mechanism.

BECAUSE all cores tend to rise or float in the mold when the liquid metal enters, the force exerted on a long slender core, as in a pipe, is sufficient to bend it upward. This results in a pipe of uneven wall thickness.

The author describes a special device for making a crooked core which, when the pressure of the metal hits it, straightens out so that the resulting pipe is of even wall thickness. By this process, pipe of the same dimensions as extra heavy wrought is being made of a low alloy chrome-nickel iron. Resistance to corrosion is one of its properties.

ticulty. A measuring device, making use of a pair of low-power long-focus microscopes with cross hairs, is useful in setting up the machine and checking its performance by direct measurements on the core diameter at various points. The limit set on diameter is plus or minus 0.003 in.

Attempts to Bend Cores in the Mold

The first attempts to compensate for the tendency of the core to float were to bend the cores downward after they were set in the mold. Various types of clamping devices were used with little or no success. Each core so deflected had to be gaged for vertical position. This was time consuming and interfered with the work of the molders and core setters and slowed down the entire operation. Also, this method necessitated two bearings or contact points at each end

of the core. In some cases the cores were shifted sidewise by the clamps which were intended to bend the core downward. The arbors were never exactly straight after having been used a few times and this also caused inconsistency as to location when double end supports or contacts were used.

The arbor used for 1½-in. pipe is made from $\frac{3}{4}$ -in. double extra heavy steel pipe. The core support consists of finished pads in the flask and turned grooves in the arbor. These supports are nearly 6 ft. apart. A 1-lb. load applied at the center of this span will bend the arbor about 0.020 in. The total weight of the molten iron displaced by the core is about 27 lb. The weight of the arbor and core is about 16 lb. The difference is about 11 lb. which, uniformly distributed, is the theoretical lifting force on the arbor. It was found by actual test that the force applied to the arbor was less than half the theoretical amount, probably because of the viscosity of the molten iron. Nevertheless, there was a decided tendency toward lifting of the core.

The final solution was reached by making the core crooked. To this end a core machine shown in Fig. 1 was

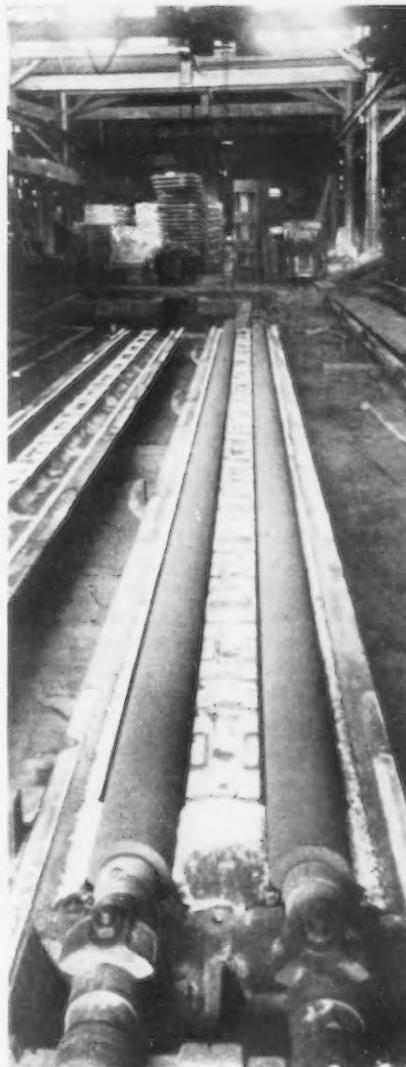


Fig. 4.—A 16-ft. flask with cores in place. No greater difficulties were encountered in casting this length than in the case of the 5-ft. size.

developed and patented. There is no change from the regular machine except in the knife, which shears off the excess sand and forms the core. This, as can be seen in Fig. 1, is

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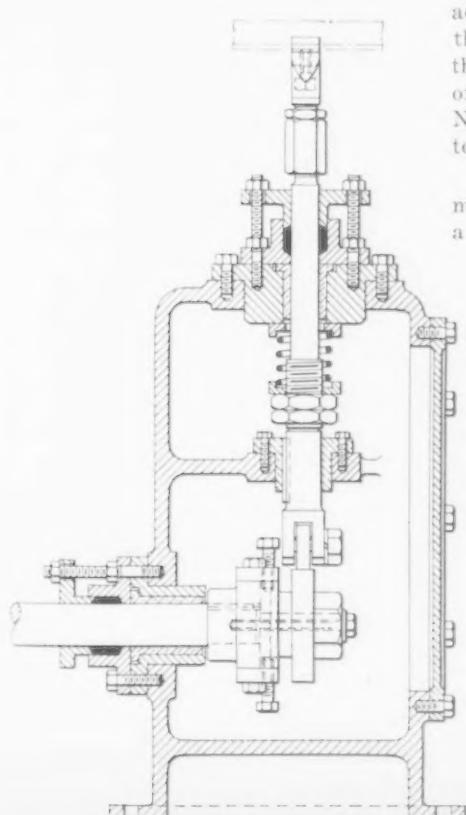


Fig. 2.—Enlarged view of the core deflecting mechanism. The knife at its center has a harmonic motion toward and away from the arbor, forming a crooked core on a straight arbor.

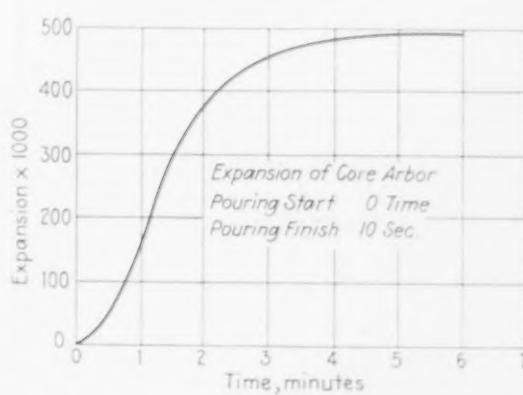


Fig. 3.—Results obtained in an attempt to arrive at the maximum temperature reached by the arbor, which during pouring becomes very hot. Difficulties arising from this were overcome mechanically.

ACCURACY AND SPEED MAINTAINED

By BURNHAM FINNEY
Detroit Editor, The Iron Age

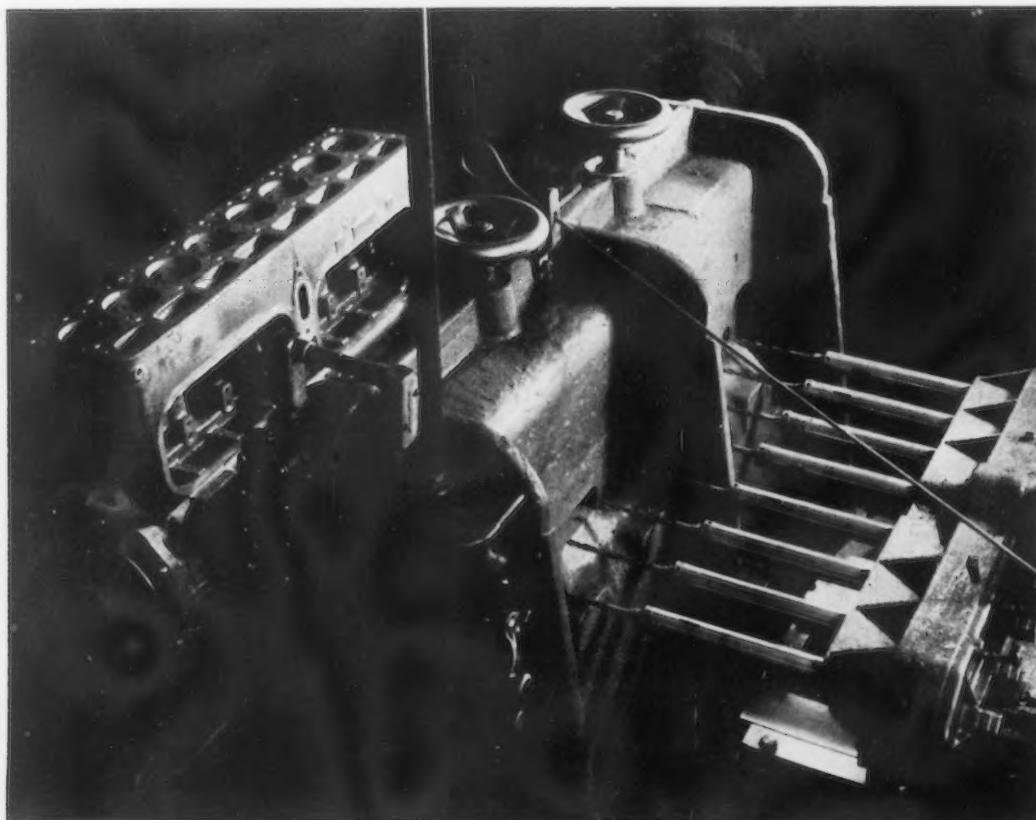
In machining cylinder crankcases, the Buick Motor Co. has made many provisions at its Flint, Mich., plant for speeding operations and at the same time stressing accuracy and quality. There are three crankcase departments capable of turning out a total of 90 crankcases an hour.

Machine tools are connected by roller conveyors, making it possible for crankcases to be pushed by hand easily and quickly from one operation to the next. In many cases air hoists suspended from an overhead monorail conveyor serve individual machine tools. The machine line weaves back and forth through the department in such manner as to maintain an unbroken, progressive movement, yet occupy as little space as possible.

Before taking up the machining operations, one should have an understanding of the principles on which all Buick activities are conducted. Briefly, the management believes that the finest, most modern equipment will prove of little avail in making a quality product unless the workmen have had long experience at Buick and are well grounded in its policies. That is, the personnel and its morale transcend in importance even the almost uncanny accuracy of present-day machinery. Stressing this fundamental principle, Buick knows that the excellent workmanship attained in its factory is due as much to the skill of its men, many of whom have been with the company 10 to 20 years, as to the efficiency of its plant equipment.

The first operation on the crankcase is to rough and finish mill the bottom on a 120-in. circular table rotary milling machine which handles seven crankcases simultaneously. Two men run this machine which mills 30 crankcases an hour. Locating holes then are drilled and reamed on a two-spindle drill press equipped with a hydro-pneumatic feed. The top of the crankcase is rough and finish milled on a rotary milling machine identical in design with that for milling the bottom.

The crankcase then passes to a boring machine that rough bores the cylinder bore and checks the cored water holes. The water-jacket cover sides, bearing-cap flange and cap seat are rough and finish milled on a special miller having a special fix-



D RILLING the dowel hole for the guide on a Buick-designed machine equipped with a special head and fixture



ED IN MACHINING BUICK CRANKCASE

THE Buick Motor Co. has three crankcase departments which can turn out a total of 90 crankcases an hour. The machine line for this work occupies relatively small space. Interspersed among tools of standard make are machines designed by Buick engineers for special jobs.

then moves to a four-way drill which drills for tapped holes in the top, gear case end, flywheel housing end and valve cover side, involving 66 simultaneous operations. Drilling an oil return hole through the front end and an oil pressure hole through the rear end on a drill press is the next operation. Following this, the crankcase is turned face up in a special Buick device.

A ventilator hole is reamed and spot faced on a boring machine; four cover holes are spot faced and the

vacuum pump hole is reamed and chamfered on a horizontal boring machine with a five-spindle head. Here the crankcase goes to a special machine designed by Buick which drills the dowel hole for the guide. The work is done horizontally and the machine is equipped with a special head and fixture.

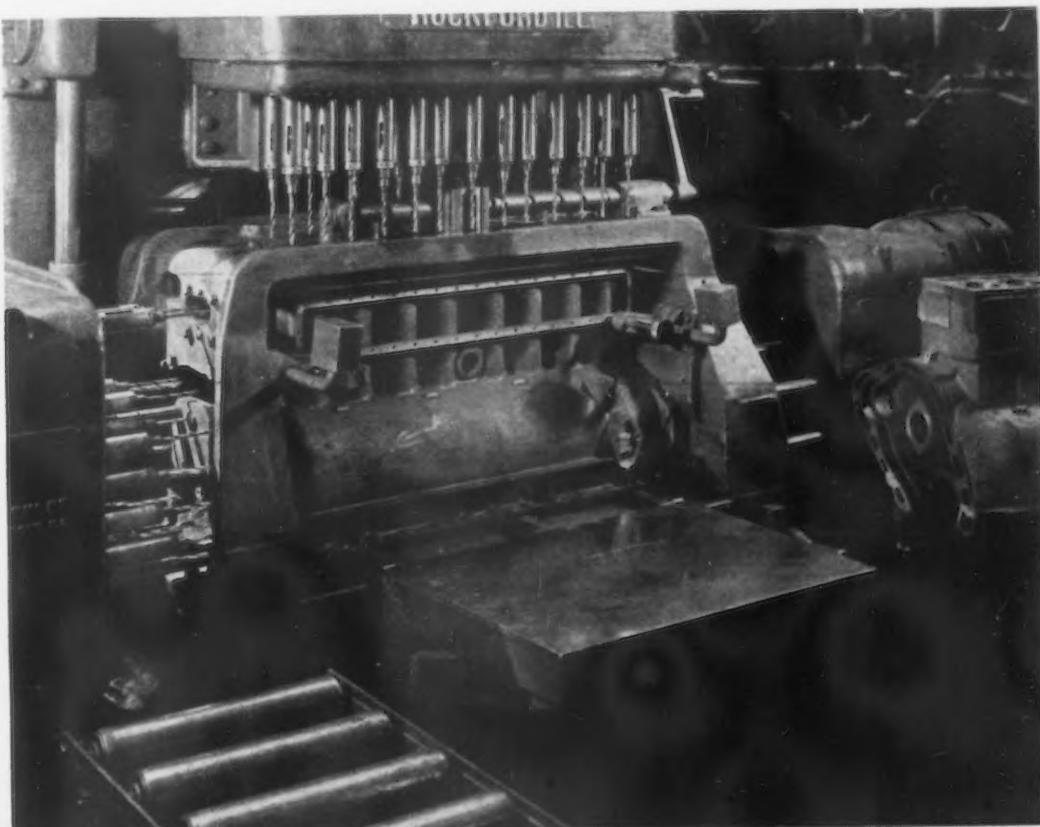
The back face of the generator boss is milled on a special machine and all holes are burred on a No. 6 pistol-grip air drill. The crankcase passes to a three-way tapper, which taps simultaneously 22 holes in the top, 21 in the valve lifter bracket side and four in the flywheel housing end. After the crankcase is turned over again, holes are tapped in the bottom, water-jacket cover side and gear case end on a three-way tapper.

ture. The next operation is rough milling the flywheel housing end, rear case end and fan-bracket boss on a rotary head miller. The valve cover side water connecting pad, camshaft boss and water pump bracket boss are milled on a profiling miller, special facing cutters being used. Valve lifter bracket bosses are machined on a traveling head milling machine and the gasoline pump pad is milled on a No. 3 miller. At this point all milling work is carefully inspected.

100 Holes Drilled Simultaneously

Holes are drilled through the top, bottom and breather tube side of the crankcase on a three-way drill which performs 100 drilling operations simultaneously (21 on top, 42 on bottom and 37 on side). The crankcase

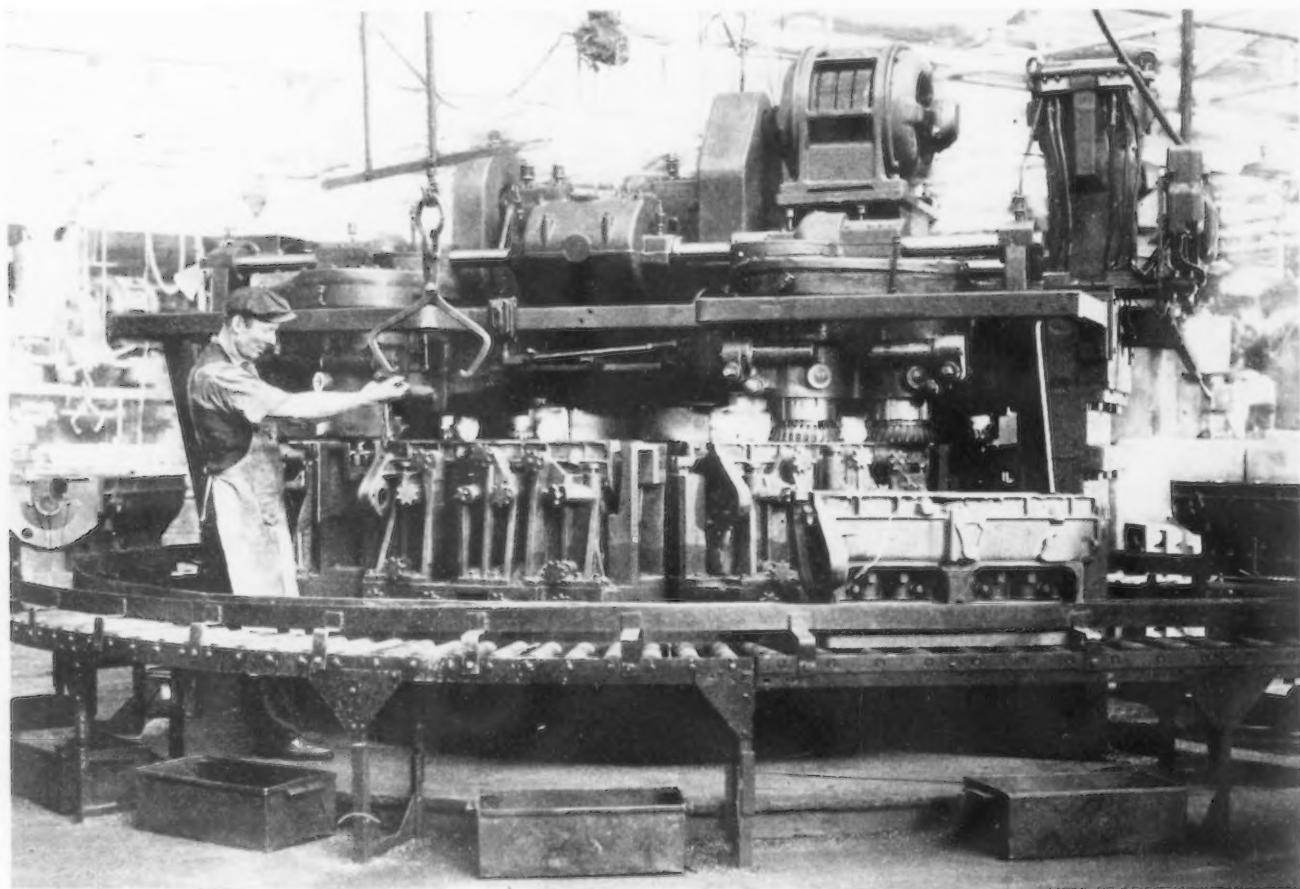
D RILLING for tapped holes in the top, gear-case end, flywheel-housing end and valve-cover side on a four-way drill. Here 66 drills are at work simultaneously.



(80 simultaneous operations). Two cooler holes are drilled on a 24-in. drill press and two straight pipe tap holes are tapped on a similar machine. The dowel holes in the water pump bracket are drilled and reamed on an upright drill carrying a two-spindle head. At this point the water pump bracket and cap are as-

sembled and reamed on a motor-driven drilling unit and the top of the cylinder bore is chamfered on a drill with an eight-spindle head. Two 9/16-in. cooler holes are drilled on a 24-in. drill press, while the bottom of the cylinder bore is chamfered on a drill with a special fixture. The cylinder bore is finish reamed on a boring

case is taken on a monorail overhead conveyor to a point where the cam bushing is assembled. Bearing caps then are disassembled by means of a nut setter, shims removed and the edge of the main bearing filed. A $\frac{3}{8}$ -in. drain hole is drilled in the gear case end with a pistol-grip air drill and a 9/32-in. drain hole is



Rough and finish milling crankcase bottom on 120-in. circular table rotary milling machine which handles seven crankcases simultaneously.

sembled by a workman using a "Hi-Cycle" nut setter.

Bearings Bored on Horizontal Machine

Main bearings, cam bearings, and generator and water pump bearings are rough bored on a box-column type horizontal boring machine, after which the main bearings, deflector and cork grooves are straddle-milled on a rise-and-fall miller. Oil holes in the front and rear cam bearing from the main bearing are drilled on a special Buick drilling machine. The gas pump operating rod bosses are drilled and the plug hole in the end reamed on a drilling unit having a 12-in. travel. Here is interposed a semi-finish reaming operation.

The oil gage tube hole is drilled, tapped and chamfered on a 21-in. drill press equipped with a 60-deg. chamfering tool for the chamfering work. The oil-level gage hole is drilled

machine with a special fixture to hold the crankcase while the bore is machined.

The connecting rod clearance in the bore is milled, oil pump hole drilled and front breather tube hole reamed on a special machine with hydraulic feed.

Cylinder Bores Lapped

Cylinder bores are rough and finish lapped on a lapping machine with the work immersed in mineral oil. After this operation, the crankcase passes through a washing machine where it is blown out and washed. It then is put through a water test, being held in a special Buick-designed fixture for this purpose. The cylinder bore then is wiped and the crankcase filed, cleaned and brushed. A thorough inspection of the crankcase follows.

After being inspected, the crank-

drilled in the ventilator chamber on a special 12-in. travel drilling unit.

A series of drilling operations follow: putting a dowel hole in the front cam bearing, a 3/16-in. hole through the rear cam bearing, redrilling four cam line dowel holes, drilling a dowel hole in the rear cam bearing and oil holes from the crank bearing to the cam bearing. Dowel holes in the main bearings are drilled and reamed on a three-spindle drill press with two heads and a special carrier for the crankcase.

Bearings Finished with Tungsten-Carbide Tools

The dowels are assembled in the main bearings, after which dowel holes are drilled, reamed and countersunk in the caps on a three-spindle drill press. A special jig is used on this job. Following several minor operations, the crankcase is

(Concluded on page 844)

Large Requirements in Plant Equipment Have Accumulated

By RUSSELL J. WALDO

OF the 846 plants which answered the author's questionnaire, 596 listed 1068 portable electrical machines of various types among their contemplated purchases. Five hundred eighty-two machines will represent additions to existing equipment, while 486 will be replacements. Used machines will be considered in 87 instances.

Electrical control apparatus is to be added in 93 plants. In no case is a contemplated purchase for the purpose of replacing existing equipment, the apparatus listed being of a different type from anything now in the plants.

Transmission Equipment Figures Prominently in Programs

Chain drives to the number of 306 are to be installed by 37 plants. In no instance does a proposed purchase represent a replacement.

Chain drives for a total of 2376 machines are to be replaced with belts in six plants as rapidly as the chains give out.

Variable speed transmissions will be installed in 38 plants. In 17 cases the transmissions represent additions and in 21 instances they will be replacements of worn out equipment.

Oil reclamation machines numbering 25 are listed in 23 reports. In all cases they will be additions to present equipment. In one instance a used machine will be considered.

Oil reclamation equipment will be bought by 14 plants. In five cases the purchase will represent an addition to existing equipment and in the remaining ten the first installation of such equipment. In addition to these 14 plants, 27 others are seriously considering oil reclamation equipment.

Oil storage equipment will be installed by 13 companies. Eight existing installations are to be enlarged,

IN our issue of March 24 the author presented the results of a survey of the accumulated machine tool needs of 846 different metal-working plants. In this article he lists miscellaneous equipment requirements of the same group of companies. He obtained his information from a questionnaire to which the executives of a wide variety of plants responded. The distribution of returns according to products made was given on page 713 of *THE IRON AGE* of March 24.

One interesting disclosure was that in the case of 837 proposed purchases executives had not yet definitely decided on the particular make of equipment that they would buy, but were still carefully comparing the merits of competitive products. The equipment they were considering was drawn to their attention by business paper advertising in 743 instances, by catalogs in their files in 91 cases and by salesmen in 12.

while five plants will put in their first installations.

Electric welders to the number of 36 are listed by as many reports. Thirty-four will be additions to present equipment while two will be initial installations. In addition to these plants, 47 others are investigating the possibilities of electric welding.

Portable floor cranes totaling 123 will be bought by 109 plants. Eighty-four of the cranes represent additions and 39 will be replacements.

Overhead conveyors will be installed in 19 plants and present installations will be added to in 36 plants. In addition, 26 companies are seriously considering such equipment. Roller conveyors are to be installed in three plants for the first time and in 14 others as added equipment.

Wide Interest in Heat Treating Furnaces

Heat treating furnaces of all types total 114 and will be purchased by 92 companies. Thirty-seven fall in the class of added equipment, while 77 will replace smaller furnaces. Three used furnaces will be considered.

Steel testing equipment will be bought by seven plants. In three cases such equipment will be used for the first time and in four it will supplement present facilities. Each initial installation is to be complete.

Metal washing machines to the number of 32 are listed by as many reports. All represent additions to

existing equipment except for one machine which will replace a smaller installation. In four cases it was stated that used machines might be purchased. Besides the 32 plants that have definitely decided to buy washing machines, 82 companies which had never had such equipment are considering purchases.

Production counters totaling

2894 will be installed by 107 companies. In the majority of these plants the method of wage payment will be changed from a straight hourly to a piece rate basis. Seven additional reports indicated the intention to change to a piece work system at some indefinite time in the future, in which case they would purchase a total of 300 counters.

Sandblast equipment is listed by 42 plants. Of a total of 48 different sandblast housings, seven will be additions to present equipment and 41 will be replacements. Used equipment will be considered in two instances.

Dust collecting systems will be installed in connection with grinding rooms and wood shops in 24 plants. These will represent initial installations. In 382 plants extensions in ducts and enlargements of equipment will be undertaken as soon as business improvement sets in.

Air compressors will be installed in three plants for the first time and will be added to existing equipment in 186 plants.

New boilers to the number of 15 were listed by 14 plants. Fourteen will be additions and one a replacement.

Power generators will be installed by five companies, each putting in one. All five will be replacements.

Heating and ventilating equipment will be put in by 11 companies. In each case an existing system will be

replaced, with steam taking the place of hot air or the reverse. All reports indicated that used equipment would be considered.

Improvements in Buildings and Furnishings

Drafting rooms will be improved in lighting and furnishings in 103 plants. Thirty-four initial purchases of drafting machines are under consideration and three machines are to be bought to replace smaller equipment. In addition to the 103 companies, 68 others are interested in drafting machines, although they have not yet definitely decided to purchase them. All of these reports indicated that furnishings in some form (files, tables, chairs, etc.) will be added.

Blue printing equipment will be installed in 34 instances. Of that number, 11 will be additions and 23 will be replacements of obsolete equipment or smaller machines. In 26 other cases the purchase of such equipment is being seriously considered.

Eighty-seven plants plan to put their tool and stock rooms in new enclosures consisting of steel framework and heavy netting in place of either all wood or part wood and chicken netting. Twenty-seven plants will enlarge their tool rooms and eight will enlarge their stock rooms. Steel shelving will be added in 21 of the above plants for the first time and added to present equipment in 14.

Enclosed offices for shops will be among the improvements in 386 shops at very early dates. These shop offices will be of wood, metal and glass, some upon the machine floor and others suspended from the ceiling. In every instance the present offices consist of makeshift space in the shop area.

New buildings are planned by 186 plants to house added equipment or extended departments. These structures will be of steel and concrete or brick to correspond to present buildings. Remodeling is contemplated by all companies reporting. Improvements range from windows in 632 plants to floors in 136 plants. Plants considering the sawtooth roof number 46.

New floor covering is planned by 87 companies. Wood blocks will be used in 51 cases. Interior painting as a means of increasing light will be undertaken in 126 plants. This work will be by present employees and with white paint.

Better Lighting Planned

Lighting systems will be changed or otherwise improved in 136 plants. This will include adding outlets, increasing wattage of the units and putting in reflectors. In 11 instances it will include changing from the usual incandescent lamps to the mercury vapor lamps. If the mercury vapor lamps prove satisfactory, further additions are planned for later

dates. Sixteen concerns plan adding to their present mercury lamps.

One hundred and eighty-six plants will change the seating of their workers and will add 872 chairs. Sixteen of the 186 plants will add a total of 48 scientifically correct chairs for a first trial. The study revealed that 287 companies are now using a total of 3873 chairs of different makes.

Lunch rooms will be added in 14 plants. They will be of varying types, from the store type to the dining room type. Each of these will be an initial venture.

Companies contemplating some sort of an employees' reading room number 137, while 83 plan enlarging their present quarters.

First aid rooms, with nurses in attendance, are being put into service in 48 plants. These will be initial installations. In 184 plants present facilities will be enlarged with the recovery of business and the addition of employees. Full-time nurses added to present staffs will number 17 and full-time physicians will be added in three instances.

Washrooms will be improved in 168 plants.

Spectral Analysis of Metals Solves Many Problems

THE applications of spectral analysis to the solutions of problems in metal industries were discussed recently by G. Scheibe (*Mitteilungen aus den Forschungsanstalten GHH—Konzern*, July, 1931). Examination of visible spectra may be used either for qualitative or for quantitative analysis, he asserts. Advantages of the method consist in its high sensitivity, freedom from hindrance of one chemical element with the determination of another, speed, smallness of sample so that a finished piece may be analyzed without injury, low cost, and documentary evidence of spectrograms. However, not all elements may be determined with equal precision, and in fact there is still no good procedure for the determination of oxygen, nitrogen or combined halogen.

The exactness of the quantitative analysis is usually from 2 to 10 per cent of the amount of the constituent present, so that, for elements composing from 0.001 to 1 per cent of the sample weight, the results are superior in accuracy to those of chemical analysis, while the latter are superior for quantities above 5 per cent.

Spectra of the materials under investigation are conveniently obtained from electric arcs or sparks between electrodes composed of the substance, either alone or embedded in auxiliary electrodes of graphite. For rapid work the spectra can be examined with the eye, or for quantitative purposes a photographic plate may be used. Thus with an inexpensive spectroscope as little as 0.05 per cent chromium may be detected in iron. By means of a photometric attachment on the ocular and a set of standards, it is possible to measure fractions of 1 per cent chromium quite accurately.

For higher percentages the precision is less, but in many cases there are lines suited for photographic determinations of higher percentages. The visual procedure is currently used in examination of steel for nickel, vanadium, manganese, tungsten and silicon. It is especially convenient in the examination of a large series of samples. The procedure may be used in plant control, for it is only necessary to have a sample of the melt in the form of two electrodes, after which the determination requires only a minute or two. Spectrograms for qualitative purposes may be made in 15 to 20 min., and for quantitative purposes in a half hour.

Greater precision may be obtained with more expensive instruments capable of analyzing the fine structure of the spectra. Thus in iron the following percentages of various elements may be detected with the simplest type of instrument: Cr, 0.01; V, 0.1; W, 0.8; Mn, 0.05; Ni, 0.2; Mo, 0.2; Co, —; Si, 0.2; Ti, —. If the glass optical system is replaced with one of quartz, the possibilities are extended. Instruments of high dispersion have found industrial application.

The blackness of the lines in the spectrograms is indicative of the concentration of the element in question, but also depends on the behavior of the plate. By means of a thermoelectric photometer or a rotating sector, it is possible to estimate the intensity of the lines, so that the analysis is exact to 1 to 2 per cent of the amount of element present in the first case or 5 to 10 per cent with the disk.

Segregation can readily be studied by spectrographic methods owing to the small samples required. They are adapted to cases difficult of treatment by ordinary chemical means.

Soldering the Rustless Steels

By V. W. WHITMER

Welding Engineer, Republic Steel Corp.

In soldering any metal it should be remembered that such a joint is one of surface adhesion only. It is not an alloy of one metal with another metal, nor is it a homogeneous mass, such as a weld or fusion. Rough surfaces present numerous fingers or projections which give the solder something to hold to. Hard, smooth or polished surfaces, on the other hand, supply no means for anchorage. Consequently, such joints may be weak. Hard, stiff materials, if deformed after soldering, will put more strain on the joint, as it will probably be the softer of the two materials. Rupture may occur. Soft materials, like copper, will bend easily after soldering, as the joint is just as strong as the sheet, if not more so. Here failure is very infrequent.

Because rustless steel is one of the stiff metals, it is necessary to make the joint mechanically strong in itself, if any particular load is to be carried. Joints should be lock-seamed, riveted, or otherwise strengthened, depending on the solder primarily as a seal, or in some cases, a fillet.

In making such joints, if very smooth or polished sheets are used, the edges should first be roughened with a coarse file or emery wheel. If this is impossible, a mixture of 50 parts ferric chloride in 100 parts muriatic acid and diluted two or three to one should be applied to the surface with an acid swab and allowed to set for 10 to 15 min. The mixture should then be carefully removed so that it will not touch elsewhere on the sheet. This method will etch the surface sufficiently for tinning. No such preliminary treatment is necessary if rough pickled sheets are used. A good rustless steel soldering flux, such as "All-Sol" or "Spears," is then applied the same as cut acid and the edge tinned, using ordinary commercial half-and-half solder. After tinning, wipe off all excess solder, leaving only a fairly thin film. In the case of a lock seam, tin both sides of each piece.

After tinning the joint should be lock-seamed, riveted or properly

WHEN new products are introduced experience in their utilization must be accumulated before the best results are achieved. Soldering of rustless steel has now reached the point where methods can be prescribed that have proved satisfactory. Such a method is described by the author.

strengthened by other means. Then, using either the same flux as before or cut acid, sweat the joint with more solder, the same as if working tin, terne or any other tinned product. No precautions need be taken with the irons other than those employed

in everyday practice. In view of this a larger iron will be beneficial, as it will supply more heat for running a longer seam without the detrimental effects from warping caused by too high a temperature. If special-analysis solders are required, such as 60-40 or even block tin, the same procedure should be followed. Do not have the irons any hotter than necessary, otherwise warping or buckling will result.

After completion of the work, all the joints and preferably the entire job should be washed with a solution of soap and 5 to 10 per cent soda to neutralize any acid which may still be present. If not removed, the acid may cause small pits and etchings, especially on polished sheets. Rinse with clean water and wipe with dry soft cloth.

World's First Anti-Friction Locomotive Completes 100,000 Mile Test

AFTER operating on fourteen different railroads since it was put in service in April, 1930, the first locomotive ever to be equipped with anti-friction bearings recently pulled into the Seattle Terminal of the Northern Pacific Railroad at the termination of the run which completed its initial test period of 100,000 miles.

The locomotive is equipped with Timken Tapered Roller Bearings in all axles—engine truck, driver axles, trailer truck

and tender trucks. During this test period it operated from coast to coast under every condition of climate, temperature, terrain, and trackage, hauling the heaviest freight and the fastest passenger trains.

The operating and maintenance figures shown by this test, which is the longest and most comprehensive ever given any piece of railroad equipment, are said to indicate that the day of the completely anti-frictionized locomotive is here.



Putting the Question Mark to Work

Color for Tools

What color would you advise for machine tools? I have read about keeping a machine shop force intact during quiet times by turning the machinists into painters. I have decided to do this in our plant but want to do a real job and so ask advice about colors to use. Would you paint all the tools the same color? Would you use different colors on the same machine? What colors would you use for the floor and walls?

L. D. S.

While not posing as experts in colors we had the same problems which you mention in our recent clean-up campaign and as we are much pleased with the results we are glad to pass them on for whatever value they may have for others. We broke away abruptly from the previously established practice of painting all machine tools battleship gray. In order to avoid too much of a rainbow effect we laid down a policy that all machine tools in the same room were to be painted the same color but we let the machinists working in each room decide the colors for their particular room and this privilege of decision gave a more personal interest in the matter and mild rivalry resulted between the different rooms as to proper colors. We suggested painting movable parts a different color or a contrasting shade and the room which we consider most successful now has the following colors: the floor is a dark gray a little darker than the standard battleship gray. The walls for a distance of 6 ft. above the floor are also gray but two or three shades lighter than the floor. Above the 6 ft. level the walls and ceiling are eggshell white. The bases, frames and stationary parts of all the tools including motor frames are a bright marine blue. The movable parts are all a straw yellow.



WE have found that the present is a particularly favorable time for the maintenance and rehabilitation of our equipment. This work may be carried on during periods of reduced demand without the usual interference with production schedules and it also helps us keep our working forces employed. We feel that if companies will put their houses in order constructively at the present time, even with due consideration for the need of expense curtailment, they will serve their employees as well as themselves.

—J. M. HIPPLE, Gen'l Works Manager Westinghouse Electric & Mfg. Co., East Pittsburgh, Pennsylvania.

low. Such parts include the spokes of wheels, and in fact all unmachined surfaces which have any movement whatever during operation of the machine.

McC. & J.

Educating Foremen

Should a machine shop foreman be an expert machinist? I was brought up to believe that a good foreman was of necessity a good machinist and that he could have no greater recommendation than that he could operate a machine tool. The tradition in this respect is strong and a change in policy might adversely affect the morale of the shop. I would like to know what experience others have had in educating foremen.

S. V. O.

This question arouses my sympathy as I have had considerable difficulty educating shop foremen to the right commercial approach. I have advanced many reliable machinists and almost invariably have found that the many years spent in operating machine tools were of comparatively little value to them in their new duties. As a result of this I have instituted in our new plant a foreman's apprentice squad which is a group of some six to ten men varying in size with the demand. Recruits are young men from different departments. For instance, at present we have two men taken from the machine shop with two or three years' experience. Two men are from the office force with technical training and from one to two years' experience in the general office routine. One man entered the squad after seven years in the estimating department and the last man in the group is a salesman. The group as a whole has the definite goal of a foremanship or superintendency before it. It sits in on roundtable discussions of department heads; it meets at regular intervals for talks and instruction from various members of the present operating staff. The individual members of the group are given regular jobs in various departments. Thus the office members of the group are now working in the machine shop and the heat treating department.

-- to Tap the Reservoir of Experience

We have no stated period before appointment from the group to a job as foreman but it is usually over a year.

J. B. J.

— 3 —

Preserving Oils

Do lubricating oils wear out? Can a much used oil be reconditioned and put back into efficient service? T. H. S.

All oils in use become contaminated from some source or other and in this sense they wear out according to a prominent authority. Some of the common causes of contamination are dust and impurities in the air, heat, water due to sweating and the mixing of oils of different origin. The same authority advises that the best way to prolong the life of an oil is to prevent contamination as far as possible rather than try to recondition the oil after it has been contaminated. Air filters exclude dust, proper venting of a circulating system reduces sweating and the use of good quality oil tends to prevent or at least delay contamination from other sources.

T. CO.

— 4 —

Buying Forgings

When is a general machine shop warranted in installing equipment and making its own forgings? We buy our forgings yet a neighboring plant with less tonnage operates its own forge shop. The forgings we use range in size from 5 to 15 lb. F. D. B.

We developed our own forge shop some years ago and are now buying forgings while the shop remains idle. Therefore our experience may be of some value al-

EDITOR'S NOTE: This page which is scheduled to appear in every second issue of THE IRON AGE is offered as a clearing house for the many everyday problems and perplexities of the steel and metal working industries. It is our hope that, on the one hand, those with such problems will feel free to state them, and on the other hand those with pertinent experience will offer it for the benefit of others. Because of the many divergent views expressed we have thought it advisable to omit all names. The answers, which are those of individual companies or outside authorities, are not always indorsed by THE IRON AGE Editors. We invite your queries and comments. Please address Forum Editor, Iron Age Publishing Co., 239 West 39th Street, New York.

ings with a fair margin of profit at a figure commensurate with a manufacturer's own forge shop costs. From our point of view the chief advantage of buying forgings outside is that this invites cooperation of another company on your own problems. L.B.

— 5 —

Company Restaurants

Our company employs from 250 to 275 men and is located in the outskirts of a city and nearly two miles from the nearest restaurant. Would it be profitable to operate a company restaurant? Also aside from the actual cost of such an enterprise is there any way of estimating the intangible values, such as increased labor efficiency, which might result from the operation of a first-class convenient restaurant?

R. V. T.

Our answer to the restaurant question is "Don't do it." There is more grief in operating a company restaurant than there is advantage. At least that is our experience. We are aware of the maxim "An army moves on its stomach" and we know that men work better when they are well fed and when the noon recess is a pleasure and not a disturbance. But with all that we discourage the manufacturer who would start his own restaurant. Men expect too much of their own company when it is in the restaurant business. If standards slip ever so little a grudge against the company may develop quickly to offset the good will of many weeks. We feel the best procedure in the case of the R. V. T. company would be to subsidize a conveniently located restaurant without having the association known publicly.

A. M. I.

Double-Crank Press Equipped with Elaborate Roll Feed

THE accompanying illustrations show a double-crank press equipped with an unusually elaborate roll feed. In addition, there are a number of special attachments and auxiliary devices for regulating the feed mechanism and for controlling the operations. Both the press and the feed are products of the special machinery department of the Toledo Machine & Tool Co., Toledo, Ohio.

The uprights of the press were made extra wide to accommodate the roll feed, and the distance between them is 39 in. The bed area is 38 in. front to back by 38 in. right to left. The stroke is 4 in., and the number of strokes a minute is 35 to 40. The weight is 60,000 lb. Separate motors are used for driving the press and for raising and lowering the slide, which is balanced by means of springs. Other features of the machine itself include the company's improved multiple-disk friction clutch with independent brake and full-automatic control, and the provision of an auxiliary operating handle, located at the extreme right of the press as shown.

Sheets are placed upon the feed

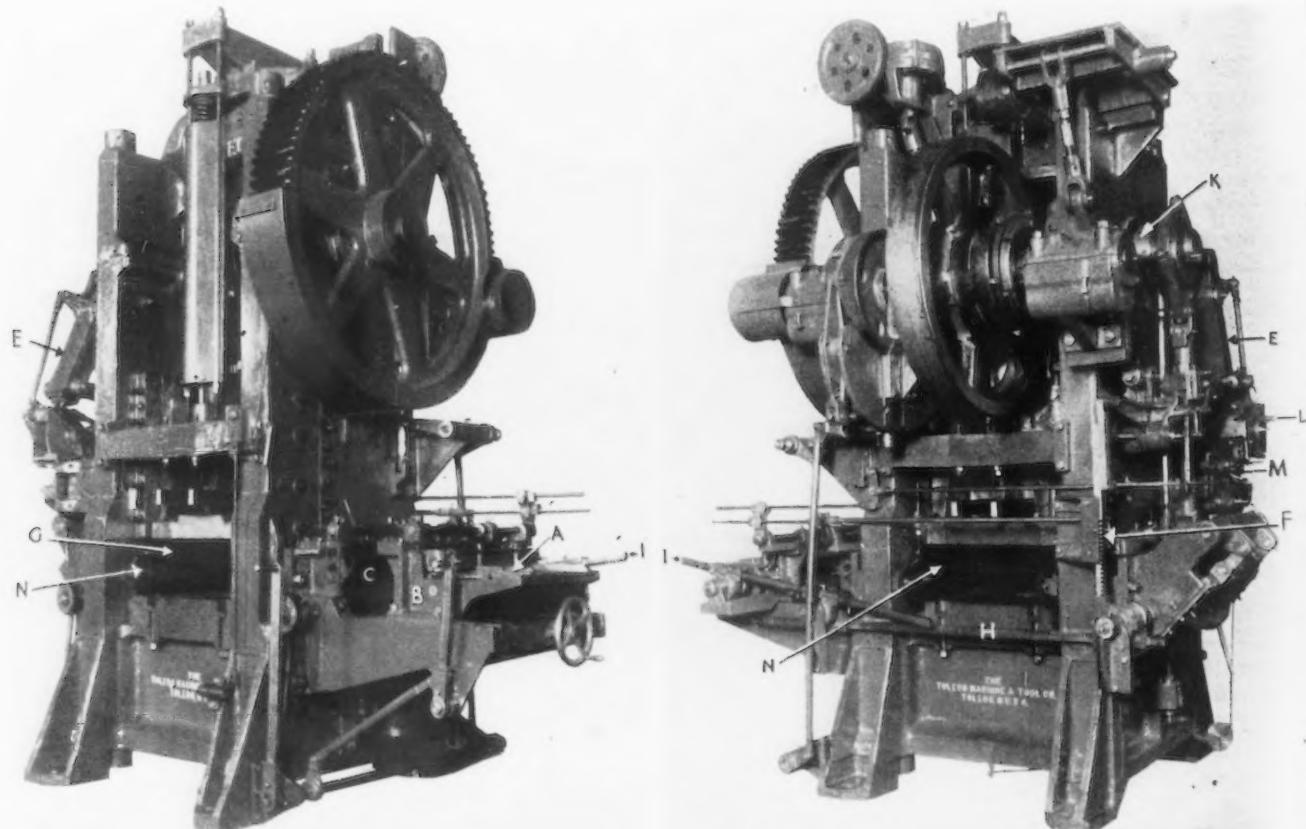
table, A, which has adjustable gages to compensate for variations in the size of sheets. The table support, B, is provided with a screw adjustment, controlled by a handwheel, which moves the table, starting rolls and an automatic starting gage to the proper position in relation to the dies. The sheet passes through the oiling rolls, C, into the main feed rolls, which are located within the housings as close to the dies as possible. All of the rolls are 22 in. wide. The lower feed rolls are 6 in. in diameter and the upper rolls 4 in. in diameter. Maximum feed is 21 in. and the minimum feed is 7 in.

The feed derives its motion from an eccentric on the crankshaft, through the bellcrank, E, which has adjustment screws to properly locate pivots to give the exact amount of feed, at controlled intervals. The motion is transmitted to the vertical rack F operating the discharge rolls G, and, in turn, through racks H and I to operate the in-going and starting rolls. Overrunning clutches and brakes on each set of rolls give positive feed of any increment.

At each stroke the rolls are released from the sheet by cam K on the crankshaft. The scrap shear, operated by the eccentric, is designed so that by removal of the gate and links the sheet scrap may be passed through without being cut up. The feed table and scrap shear can be adjusted vertically up to 3 in. to suit the height of the dies.

After locating the pin L to agree with the number of blanks to be made in one sheet, and then adjusting the length of feed, length of jump, position of the starting gage, and the time of raising and lowering of starting rolls at the adjustment point M, a sheet is placed against the starting gage any time after the starting rolls are raised. The starting rolls drop and the gage rises automatically, carrying the sheet through the oiling rolls and into the in-going rolls, which move the sheet across the die and into the discharge rolls. The latter feed the tail end of the sheet through the scrap shear. The finished pieces remain in the punch until the top of the stroke, when they are knocked out positively and fall upon a blank-removing device N, which carries them to the rear on the down stroke of the press.

An order amounting to \$2,000,000 for electric refrigerators has been placed by the Elin Co., Philadelphia, with the Westinghouse Electric & Mfg. Co.



In addition to the automatic roll feed, the press has a number of special attachments and devices for regulating the feed mechanism and for controlling operations

OPERATING racks, locating pins and other parts of the roll feed mechanism are shown in the rear view above. The scrap shear is driven by the eccentric

New Hydraulic Feed Keyway Milling Machine

A NEW keyway milling machine built from standard basic and semi-standard Hydromatic units is now being offered by the Cincinnati Milling Machine Co., Cincinnati, Ohio. Keyways can be milled in shafts from 1 in. to 18 in. in diameter. The straight section of the keyway is milled by a slotting cutter, and at the same setting the ends are rounded out by an end mill in the vertical spindle.

All controls including that for table, spindle, infinite feed (hydraulic) changes within the range, and rail assembly movements have been centralized, and all control levers are directional. Adjustments are easily made. The slotting cutter is raised up and out of the cut by power, aided by a hydraulic counterweight.

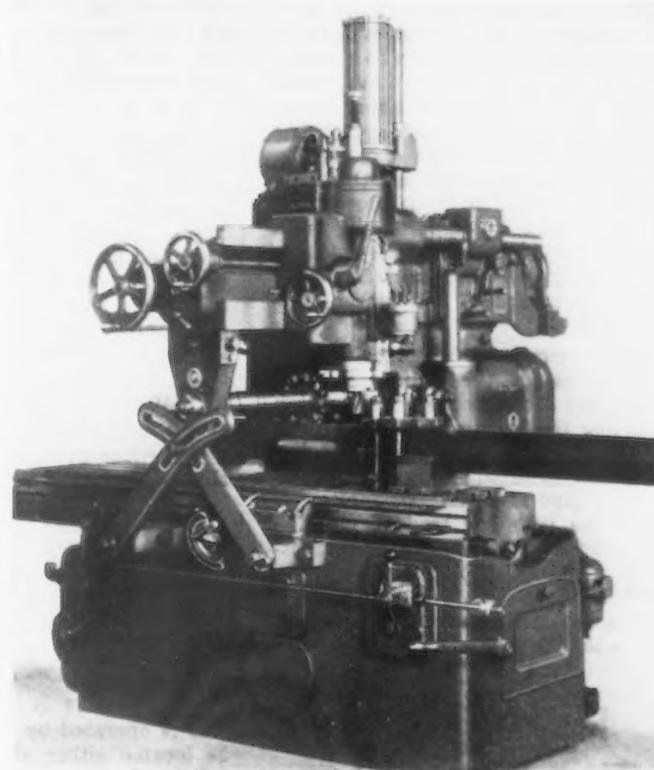
Ample power and speed are provided for both spindles, 10 hp. for the horizontal cutter and 5 hp. for the vertical mill. Any table feed up to 40 in. is available. Twelve speeds, ranging from 90 to 810 r.p.m. are available for vertical spindle; the speed range of the horizontal spindle is from 20 to 150 r.p.m. Higher speeds can be furnished. Both spindles have national standard taper holes.

The drive for the slotting cutter is the standard antifriction drive with only four gear contacts, while the vertical carrier is driven from an independent motor mounted on the right-end of rail. Speed changes for the vertical carrier are made quickly through sliding gears by movement of levers provided for the purpose. The final drive is through spiral bevel gears.

In addition to flexibility of adjustment and control, the machine features massiveness and rigidity. The rail is doweled to the top of the horizontal carrier, which slides on a narrow guide with taper gibbing, and unusually large bearing surfaces are provided for both carriers. The horizontal arbor is supported by a self-oiling aluminum arbor support, and there is no overhang. Two quick-acting cam clamps are provided, one for clamping vertical carrier on rail and the other for clamping spindle in carrier. The horizontal carrier and rail unit are clamped on the headstock by shifting cam lever just above turret stop.

Repetitive settings insuring duplicate work are possible because the dial and turret stop arrangements for both horizontal and vertical carriers are included. Accurate length of keyway is obtained through use of the graduated scale mounted on table

THE straight section is milled by a slotting cutter and the ends are rounded by an end mill in the same setting.



chip guard. Two pointers, extending over the scale, are spaced 9 7/16 in. apart, equal to the distance between spindle carrier centerlines.

This milling machine is made in a number of sizes with any length bed. Special fixtures for holding shafts can be supplied.

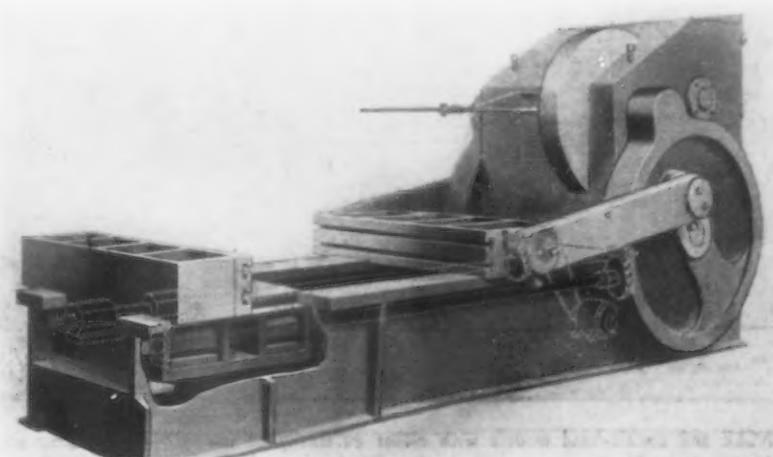
Bulldozer Has Power Adjusted Die Holder

A POWER-ADJUSTED die holder is the outstanding feature of the new line of bulldozers and bending machines brought out by the Steel-weld Machinery Co., Cleveland. This company, which for some time has been building bulldozers of all-steel construction, has found that in a majority of applications the time of

changing and setting up dies is a more important element of cost than the actual bending of the work. Very often it has taken a half day to set up the dies for a job that could be bent in two or three blows.

In the machine illustrated the die holder moves. The bending parts of the dies fastened to the ram and slide are brought together by a push button in very much the same way as the rams of power-operated bending brakes move. An additional advantage of this arrangement, it is pointed out, is that the long tie rods which run through to the operating head of the machine make it impossible to break the tool, for the flywheel, clutch, gears and motor will stall before the danger point is reached.

The maximum power of the bulldozer naturally is developed at a



point where the crankpins go over the center of the movement or as nearly to this point as can be reached. Jobbing shops frequently have heavy bends of a depth requiring more power than can be developed on the available machine with one stroke. With the moving end on the bulldozer it is stated that such bends can be made with a comparatively light machine by using two or three strokes and moving the dies up after each stroke by means of the power-operated rear end.

The gearing is inclosed in the all-steel frame of the bulldozer. The main slides are of hardened and drawn steel and the gibbs are located underneath the ram out of the way of dirt and scale. The only castings used in the machine are of Meehanite, of which the gibbs are made. The flywheel and high-speed shaft are mounted on anti-friction bearings. Reversing twin disk clutches are used. The tool is provided with variable speeds and brake.

Pipe and Nipple Threading Machine

IN announcing the 1½-in. Landmaco pipe and nipple threading machine the Landis Machine Co., Waynesboro, Pa., emphasize wearing qualities, accuracy and production at low unit cost. Single and double-head models, equipped either with externally or internally-tripped Lanco pipe and nipple threading heads, are made. With the externally-tripped heads the range is from ¼ to 1½ in.; with internally-tripped heads it is from ¼ to 1½ in.

Single-pulley drive with friction clutch control is regularly furnished. The clutch, mounted on the outer end of the drive shaft, is accessible for the ordinary maintenance adjust-

ments. The machine can be motorized by mounting a suitable motor in the motor compartment in the bed and connecting it to the drive shaft with a silent chain.

The gear box is of the selective type with eight speeds. It is built into the headstock and is fitted throughout with anti-friction bearings. The gears are of chrome-nickel steel and are hardened and burnished; they are mounted on heat-treated alloy-steel shafts. The bearings and gears are lubricated by a flood system. The spindle is driven by spiral bevel gears. The anti-friction bearings at the die-head end are oversize and are pre-loaded.

To reduce overhang to a minimum, the die head is located close to the front spindle bearing. It may be opened and closed either automatically or by hand. The automatic opening mechanism operates through a trip rod and yoke with the externally-tripped die head and through the reaming attachment with the internally-tripped type.

The carriage is gibbed to the bed and is operated by a lever which can be located either at the right or the left-hand side of the carriage. The guides are protected by guards and wipers. The guards are attached to the front of the carriage and pass under the headstock. The wipers are located at the rear end of the carriage and are adjustable for wear. The guides are lubricated by felt pads in the base of the carriage and fed from a central reservoir.

The vise has both horizontal side-wise and vertical adjustments, which make possible an accurate alignment between die head and work. The heavy rim of the vise hand wheel acts as a fly wheel and reduces the effort required to grip the work.

The pump is of the low pressure gear type. It is built into the bed,

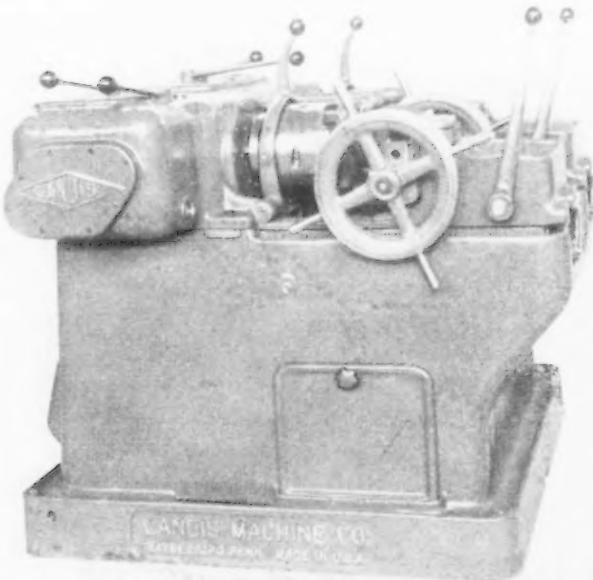
and can be removed for inspection without disconnecting any piping. The pump reverses automatically when the machine is reversed.

Toolroom Flame Cutting Machine

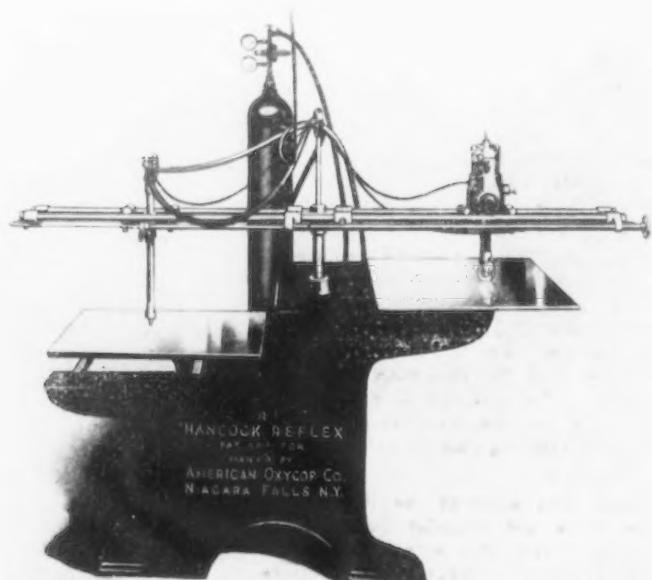
THE new Hancock profiling machine placed on the market by the American Oxyacetylene Co., Niagara Falls, N. Y., is designed for cutting dies, cams, stripper plates, jigs, etc., the machine being fitted with a universal head to facilitate reproduction of the most intricate drawing in the form of a die or an irregular shape. Operation may be either manual, semi-automatic or full automatic. Material ranging from ¼ to 8 in. in thickness can be cut.

The usual profiling cutter is superseded by the Hancock coal gas burner which employs natural coal or butane gas and oxygen. The gas is used at a calorific value as low as 500 B.t.u. under normal pressure, no booster being required. It is stated that 1-in. steel can be cut at the rate of 12 in. per min. and 1½ in. steel at 9 in. per min. Consumption of coal gas is only 30 cu. ft. an hour, while the consumption of oxygen varies according to the thickness of the metal being cut. The cut is smooth and sharp and only 1/16 in. is left for machining. The condition of the steel remains unchanged after cutting, being neither carbonized nor decarbonized.

Cutting speeds ranging from 3 to 12 in. per min. are obtained by the special motor used on the machine. A circle cutting device enables circles to be cut at any point, the diameter range being from 2 to 18 in. An aluminum table is supplied for tracing purposes and a special plywood table for wood or metal templates.



SINGLE and double-head models with either externally or internally tripped Lanco pipe and nipple-threading heads are built.



THE burner employs natural, coal or butane gas, and oxygen. The cutting does not affect the condition of the steel.

Realistic Treasury Policy Necessary to Financial Confidence

By DR. LIONEL D. EDIE



THE startling feature of the political battle over the national budget is not the sudden difficulty encountered in balancing the budget, but the willingness of the Treasury to have allowed a deficit to run for so long a period without serious effort to correct the evil. Overnight the nation becomes budget conscious, after having run in the red for upward of two years, and the nation abruptly seizes everybody that unless the budget is balanced immediately, disaster impends. Fiscal hysteria spreads abroad, confidence receives a serious setback, anxiety unsettles the bond market.

The official estimates of revenues have for many months erred on the side of hope and optimism. They have rested on the sanguine assumption that somehow business must pick up and, therefore, revenues would increase.

Final recognition of the low levels of depression has at last made the budget the focus of Congressional attention. The public at large is assured that an additional tax burden of around \$1,250,000,000 solves the problem. As later paragraphs will suggest, there is grave doubt whether even this additional tax burden performs the feat of balancing the budget. The official tax program is a long step in the right direction, and this will have a strong influence on the constructive side, but a realistic attitude forces one to admit that the job will not thereby be fully completed.

The 1932 Borrowing Requirement

During the next three months, which constitute the remainder of the current fiscal year, the Federal Government will probably be compelled to borrow as a monthly average in the neighborhood of \$400,000,000 to \$500,000,000 of new funds, and, in addition, nearly \$150,000,000 as a monthly average for refinancing. The uncertainty as to the exact amount arises from the fact that special appropriations have not yet been determined and that the full amount of funds to be required by the Reconstruction Finance Corporation before June 30 is unknown. The above figures are believed to be an understatement rather than an overstatement.

These borrowing requirements are a very heavy strain upon the bond market. The public is so uncertain about the economic future that long-term "Governments" are not readily ab-

PROSPECTIVE increases in taxes are unlikely to balance the national budget, in Doctor Edie's opinion. Extensive borrowing will still be necessary. Yet the total tax burden (Federal, State and local) will be very heavy this year, representing 25 to 30 per cent of the national income as compared with 15 per cent in 1929. This load will impose a heavy handicap on business and will result in more insistent demands for retrenchment in political expenditures. It is also likely to foster sentiment for radical monetary experiments. The impact of these developments can be softened by Federal Reserve policy.



sorbed except at very high rates. The bulk, if not all, of the new borrowing may, therefore, be expected to be of short-term character.

The short-term market, in turn, needs careful grooming for the race. Money rates have eased, partly from natural causes, and partly from policy. The reduction of currency in circulation and the reduction of rediscounts, both in substantial amounts in recent weeks, have eased the money market along natural lines. The rate on bank acceptances has declined in large part because of a growing shortage of acceptances available, this being traceable in turn to the shrinkage of foreign trade where acceptance financing is employed. The discount rate has been lowered from 3½ to 3 per cent at the New York Federal Reserve Bank, and there would be little surprise if it were further lowered to 2½ per cent. Obviously, all these tendencies toward lower rates in the various money markets help to support the price of "Governments" and aids the Treasury in floating new issues at rates much lower than would otherwise be possible.

The ostensible rate on "Treasuries" is not, however, a complete reflection of the price which has to be paid to float new issues. The tax-exempt features of the "Treasuries" mean, in effect, that the Government is compelled to pay substantially more than the nominal rates of 3½ to 3¾ per

cent in order to persuade people of means to subscribe.

The proposed new surtaxes will tend more than ever to drive money into tax-exempt Treasuries, and will, therefore, help to create a market.

The Role of the Banks in Absorbing New Treasury Issues

But the market cannot be found entirely in private channels. The banks must stand ready to absorb whatever part of the new issues is not taken by the private market.

The first resort, in this behalf, is the member banks. Their buying power is partly out of liquid funds already available, but this may not be adequate. They may need to rediscount at the Federal Reserve in order to obtain sufficient funds for the purchase of the new "Treasuries." Will the large city banks be willing to rediscount for such a purpose? Probably they will, if a sufficient spread is allowed between the discount rate and the rates paid on the new "Treasuries." If they can rediscount at 2½ to 3 per cent and obtain 3½ to 3¾ income from "Treasuries," the spread is profitable and reasonably attractive.

Even this profit may not, however, be a sufficient motive. The banks remember that the "Borrow and Buy Bonds" slogan of the war period led to inflation and they may be unwilling to repeat the experiment. On the other hand, it may be put up to them as a patriotic duty to see to it that Government flotations are a success. Hence, probably they will rediscount and buy to whatever extent is necessary to help out the Treasury, partly from patriotic duty and partly from the profit motive.

As a final resort, the Federal Reserve banks are in a position to buy bonds outright, and presumably stand ready to do so as the occasion demands. The need to hold buying power in reserve for the occasion may have some bearing upon the policy of the Federal Reserve in open market bond purchases in recent weeks. Such purchases have been made, but in quite moderate amounts. Why so moderate? If for no other reason, perhaps for the reason that the Federal Reserve banks desire to keep some powder dry for the day when huge quantities of new "Treasuries" are thrown upon the market. If they are not all absorbed by the private market and by the banks, the Federal Reserve banks can step in and in-

sure full and complete absorption of the new issues. In a sense, they guarantee that the new issues will go over.

They are enabled the better to fulfill this role because they are relieved of near-term worry about their free gold by the provision of the Glass-Steagall bill. This is a technical question and need not be explained in detail in this brief analysis, but it is important as a means of giving the Federal Reserve banks a freer hand.

Such a role for the Federal Reserve banks will be criticized in many quarters as an act of inflation of war-time character. The criticism is legitimate, but the emergency is a condition, not a theory, and having gone without a balanced budget for so long,

penses and revenues of the 1933 year, I cannot see how even the new tax burden will balance the budget. It appears that revenues are officially estimated on the assumption of a 15 per cent pick-up in business. This is a pleasant assumption, but whether it will be fulfilled is one of the great unknowns. Moreover, apparently the official calculation treats some \$270,000,000 of war debts due as receipts. Every man is entitled to his guess, but why the Treasury should guess that war debt monies will actually be paid in during 1933 is a bit hard to understand. Moreover, the Reconstruction Finance Corporation may call for more funds and special appropriations may call for more.

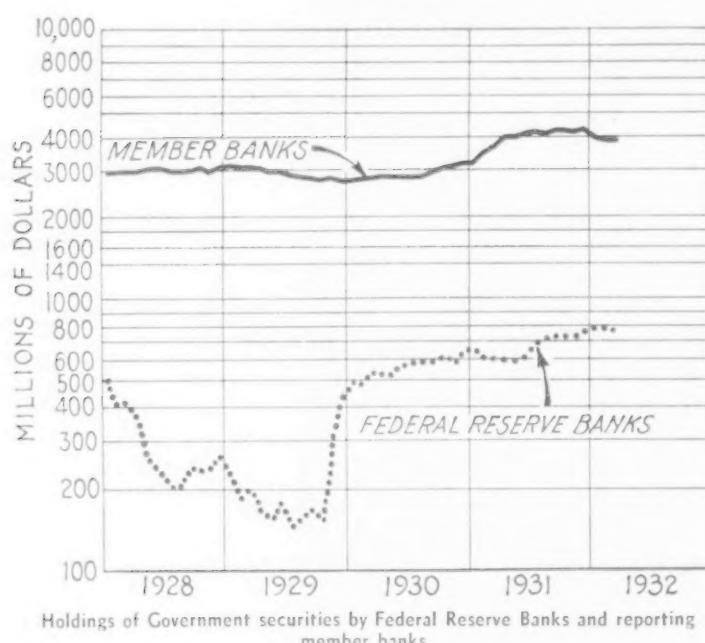
policy pursued in the United States in recent years. The elimination of nearly one-quarter of the reserve base (i.e., member bank reserve balances) was a sort of *carte blanche* for deflation to run its course unimpeded. Rescue corporations were set up to pick up the pieces from the wreckage, but there also piled up more taxes and more debt.

The writer believes that this deflation was unnecessary, that it could have been restrained by Federal Reserve policy, but that question is open to difference of opinion, and this is not the place to debate it.

Public opinion is slow to catch up with such great events, and there is always the risk that when it does it will react along radical lines. In the present instance, the public mind has been slow to associate the burden of debts and taxes with monetary policy, but it is gradually doing so, and eventually it may respond by demanding legislation along monetary lines. At the moment, a cash bonus bill, the cash to be obtained by printing more paper money, has wide popular support. If matters do not mend, the second half of the year may see radical schemes for free silver or Greenbackism in some form gaining a wide popular following.

The situation contains risks of rather serious character. The policy of monetary deflation runs the hazard of producing in the mind of the public a sharp revulsion of sentiment in the opposite direction. Hence, the very people who are extremists in advocating deflation to the bitter end are likely to create a violent swing of the pendulum in the opposite direction from their desires.

Undoubtedly a balanced budget is an indispensable basis for confidence in sound national finance. Apparently Congress, after some preliminary turmoil, is adopting an attitude of effort to make income equal outgo. We may well be thankful for this effort because it constitutes an important step in the right direction. Apparently a large part of the public, both in this country and abroad, will be convinced that the budget is balanced if the official tax program is met. Without wishing at all to dampen ardor, I wish to point out that as time goes on the discovery will probably be made that even the added tax burden does not actually balance the budget and that the gap is still fairly important. If and when such a stage is reached, more extreme measures may be strongly advocated in one quarter or another. Such measures are likely to include a more vehement demand for retrenchment in expenditures, a plan for debt conversion, and plans for direct inflation by the fiat money group. Doubtless all of these possibilities will be moderated and tempered in proportion as the Federal Reserve banks adopt a sufficiently vigorous open market policy to arrest unmistakably the deflationary momentum hitherto prevalent.



we can scarcely escape some degree of extraordinary treatment. Nor is it altogether certain that Federal Reserve purchases will be on a scale sufficient to produce inflation. At any rate, inflationary or not inflationary, the Federal Reserve will probably go any reasonable distance necessary to insure the success of new Treasury offerings.

The accompanying chart shows fluctuations since 1928 of holdings of "Governments" by the Federal Reserve banks and by weekly reporting member banks. In recent weeks both curves show slight upturns. These reflect in some degree the cooperation of the banking system in the Treasury's March 15 financing program. The Federal Reserve portfolio of "Governments" has risen to \$872,000,000, but the amount may be subject to sharp changes during future months.

The tax legislation now producing all the excitement in Congress does not help out on the 1932 deficit. It bears upon the next year's deficit, that of the 12 months ending June 30, 1933.

As nearly as I can estimate the ex-

All in all, it is difficult to see how the new tax quota set up by the Treasury gives us a balanced budget. A 1933 deficit of a billion dollars or more, in spite of the new tax burden, will be difficult to avoid.

In 1929 the total tax burden of the United States, National, State and local, was the equivalent of about 15 per cent of the national income. In 1932 it will be the equivalent of 25 to 30 per cent of the national income. The carrying of this enormous burden imposes a severe handicap upon all the normal processes of recovery.

And yet, strangely enough, the demand for retrenchment in political expenditures has not become very vociferous. It will become more so.

Unless retrenchment becomes more effective, it is only a question of time before the United States has to face the question of conversion of debt to a lower rate basis. This step has been taken in Australia and is under contemplation in Great Britain. Debt conversion may prove to be a lively political issue in the United States within a year.

The public is slow to relate the burden of debt and taxes to the monetary

Higher Rate for Pipe in Mixed Carloads

WASHINGTON, April 5.—The Interstate Commerce Commission has found justified a rule proposed by railroads which has the effect of raising rates on steel pipe mixed with other iron and steel products when the combined weight of the pipe and related articles exceed one-third of the entire weight of the shipments, whose minimum will be 40,000 lb. Under the so-called mixing rule, the rate applicable on pipe was 32½ per cent of the first class rate. It covers shipments within the Southwest and between points in the Southwest on the one hand and points in the South and Official territory on the other. This rate applies regardless of the mixed tonnage. It might be largely pipe and hardly any other steel products. Under the new rule the pipe or fifth class rates will be applied when the combined weight of the pipe, connections, couplings, etc., exceed one-third of the combined weight of the shipment. The new rates become effective April 7.

The rule is intended to maintain rates on pipe and to avoid the substitution of light tonnages of other steel products so that the shipments would come under the mixed rule.

The commission report says:

On a minimum carload shipment of 16,000 lb. of pipe from Pittsburgh to Oklahoma City, Okla., the applicable rate is 88.5c., total charges \$407.10. By the substitution of a 100-lb. keg of nails for 100 lb. of pipe, the applicable rate becomes 86c., the column 32½ rate, and the total charges \$395.60. Under the suspended proposal the total charges on such a "mixed" carload would be \$408.56, or the minimum of 46,000 lb. of pipe at a rate of 88.5c. and 100 lb. of nails at the fourth-class rate of \$1.46.

Gray Iron Foundries Report February Gains

Production by gray iron foundries increased over 1½ points and new business increased 2 points in February, according to the monthly report of the Gray Iron Institute. February production was 39.4 per cent of normal, compared with 37.8 per cent during the previous month, and new business increased to 37.4 per cent. Unfilled orders declined slightly from 28.9 per cent to 28.5 per cent.

International-Stacey in Hands of Creditors

The International-Stacey Corp., Columbus, Ohio, has been placed in the hands of a creditors' committee, which includes O. M. Havekotte, credit manager, Carnegie Steel Co., and S. H. Barrett, treasurer, Columbus Bolt Works, Columbus, together with representatives of three banks. The International-Stacey Corp. was formed in April, 1931, through a merger of the Stacey Mfg. Co. and Stacey Broth-

ers Gas Construction Co., both of Cincinnati; Connersville Blower Co. and P. H. & F. M. Roots Co., both of Connersville, Ind.; the Wilbraham Green Co., Pottsville, Pa.; International Derrick & Equipment Co. of Oklahoma, Tulsa, and the International Derrick & Equipment Co. of Texas, Beaumont.

C. F. Abbott Approves Nye Bill

WASHINGTON, April 5.—Passage of the Nye bill to legalize trade practice conferences was urged by Charles F. Abbott, executive director, American Institute of Steel Construction, in testimony he gave on the measure last Thursday before a subcommittee of the Senate Judiciary Committee. Mr. Abbott emphasized the necessity of such legislation so as to bring about agreements in the construction industry which would eliminate "bid peddling." Expressing preference for American private initiative, Mr. Abbott said that unless present intolerable conditions are removed through self-regulation, State control is the only alternative.

To Sell Farm Machinery for Corn, Wheat, Cotton

The International Harvester Co. is offering credit to purchasers of farm machinery on the basis of 70c. a bu. for wheat and 50c. for corn at Chicago and 8½c. a lb. for cotton at New Orleans.

George A. Ranney, vice-president in charge of sales, explains that the company is convinced the farmers' reluctance to buy farm machinery is due to present unsatisfactory crop prices and that if they are assured of higher prices they will buy. The company is therefore offering assurance of higher prices with which to pay notes given hereafter and maturing this year.

The machines to which this applies are farm tractors, combines, windrow threshers and stationary threshers. On notes maturing in 1932, given hereafter in payment for these machines and representing not more than 40 per cent of the purchase price, there will be indorsed the equivalent of bushels of wheat or corn or pounds of cotton computed at the prices named. If the average market quotation for the five-day period prior to and including the maturity date of the note is less than the price named, the purchaser will be credited with an amount representing the price differential multiplied by the number of bushels or pounds indorsed on the note.

The spring meeting of the Steel Founders' Society of America, Inc., will be held at the Roosevelt Hotel in New York, Wednesday, May 18, the day preceding the meeting of the American Iron and Steel Institute.

Testimonial Dinner to Be Given James A. Farrell

The American Iron and Steel Institute will give a testimonial dinner to James A. Farrell at the Waldorf-Astoria Hotel, New York, Thursday evening, April 21. All members of the institute will be invited to attend and it is estimated that between 600 and 700 will send in their acceptances. Mr. Farrell will retire from the presidency of the United States Steel Corp. on April 18.

The testimonial dinner will be preceded by a regular meeting of the directors of the institute. Mr. Farrell is now a vice-president and director and no doubt will be made an honorary vice-president as a token of esteem.

Gears & forgings, Inc., in Receivership

Gears & forgings, Inc., Cleveland, has been placed in the hands of liquidating receivers following proceedings brought in the Federal Court in Cleveland by the Republic Steel Corp., a creditor. S. C. Dalbey, secretary and treasurer of the company, and F. L. Leckie were named as receivers. Gears & forgings, Inc., was organized in January, 1928, through a merger of the Van Dorn & Dutton Co. and Ohio Forge Co., Cleveland; the Fawcett Machine Co., Pittsburgh, and the William Ganschow Co., Chicago.

Sacramento Jobbers Have Merged

The Thomson-Diggs Co., wholesale hardware house with steel department at Sacramento, Cal., has purchased the Schaw-Batcher Co., its local competitor. Both are historic California houses dating back to pioneer times. The executive personnel of the Thomson-Diggs Co. includes C. F. Prentiss, president; F. F. Thomson, vice-president and general manager; J. W. Geeslin, secretary and treasurer; A. E. Goddard, sales manager.

Steel Plate Orders Rise

WASHINGTON, April 5.—Orders in February for fabricated steel plate rose to 17,755 tons from 17,613 tons in January, according to reports received by the Bureau of the Census from 51 manufacturers. The February orders in tons were distributed as follows: Oil storage tanks, 4115; refinery materials and equipment, 525; tank cars, 13; gas holders, 1285; blast furnaces, 40; miscellaneous, 11,777.

United States Steel Corp. has signed a contract for an exhibit of the steel industry in Chicago's 1933 World's Fair.

Britain Still Affected by Low Continental Steel Prices

Quotations in England, Including Tariff, Are Below Those Formerly in Effect—Business Slowly Reviving

LONDON, England, April 4 (*By Cable*).—Iron and steel demand is improving slowly. Home consumption is increasing, but export orders are scarce.

British steel makers are confident that existing tariffs will be raised within the near future, as present Continental steel prices here, with 10 per cent duty added, are lower than those ruling before the introduction of the tariffs.

The Continental steel market continues weak, with keen competition between Belgium, France and Luxembourg. The Belgian situation is growing worse, and pig iron production in that country has been further reduced. German mill output is still restricted, but should improve shortly as the result of the recent German bookings of Russian contracts. Russia has placed 35,000 tons of tubing with a German syndicate, but under the international arrangement about 25 per cent of the total order will be distributed among other members of the International Tubing syndicate. Poland has exchanged 16,000 tons of rails for Belgian tobacco of equal value.

Welsh tin plate business is quiet. Mills are adhering to the agreed minimum of 16s. base, f.o.b., but second hands are making offers as low as 15s. for ordinary sizes for prompt

British Prices, f.o.b. United Kingdom Ports

Per Gross Ton		
Ferromanganese, export	£9 0s.	to £5 10s.
Billets, open-hearth...	5 5	
Black sheets, Japanese specifications	9 12	6d to 5 15
Tin plate, per base box	0 15	6 to 16 0
Steel bars, open-hearth	7 17 1/2	to 8 7 1/2
Beams, open-hearth...	7 7 1/2	to 7 17 1/2
Channels, open-hearth	7 12 1/2	to 8 2 1/2
Angles, open-hearth...	7 7 1/2	to 7 17 1/2
Black sheets, No. 24 gage	8 0	to 8 10
Galvanized sheets, No. 24 gage	9 10	

Continental Prices, f.o.b. Continental Ports

Per Metric Ton, Gold £ at \$1.86		
Billets, Thomas	£2 3s. 6d	
Wire rods, No. 5 B.W.G.	5 5	
Black sheets, No. 31 gage, Japanese	11 5	
Steel bars, merchant...	2 6	
Beams, Thomas	2 7	6
Angles, Thomas, 4-in. and larger	2 6	
Angles, small	2 8	
Hoops and strip steel over 6-in. base	3 5	
Wire, plain, No. 8	5 7 1/2	
Wire, barbed, 4-pt., No. 10 B.W.G.	8 15	

shipment. There are large inquiries from home consumers of tin plate covering deliveries up to the end of the year, but the business has not yet been placed. Most of the works have fairly good order books, and hence there is no pressure to sell.

Railroads to Accept Scrap Trading Changes

The scrap committee of the American Railway Association has accepted recommendations proposed by the railroad scrap committee of the Institute of Scrap Iron and Steel to change certain terms of award and sale of railroad scrap, according to an announcement by Benjamin Schwartz, director general of the institute. The proposals were originally made at a joint conference of the two committees at a meeting held last October in Pittsburgh and were finally acted on at another joint meeting of the committees held in Washington on March 10. The report will be delivered at the annual convention of the American Railway Association and, if approved, will be incorporated in the scrap contracts of the individual railroads.

The Pennsylvania Railroad has announced that it will immediately put into effect one of the proposed

changes, without waiting for the action of the A.R.A. convention. Heretofore the Pennsylvania Railroad provided that claims for shortages must be \$10 or over before they would be investigated. Beginning with the April list of the Pennsylvania Railroad, claims for shortages of 1000 lb. and over will be investigated.

"We recognize that with present price levels, this change should be put into effect at once and accordingly our next offering will provide for this feature," wrote C. E. Walsh, purchasing agent, Pennsylvania Railroad, to the institute, in making this announcement.

The following are some of the proposals accepted by the committee of the American Railway Association: Shipments to be made within 30 days after receipt of shipping instructions, which shall be issued within 10 days after notice of award has been received; claims for apparent shortages of 1000 lb. or over will be considered, provided necessary documents are presented within 30 days, under cer-

tain conditions; net ton basis shall be uniform for all railroad scrap lists; where more than one car is offered for sale the offer shall be in tonnages instead of in cars; all cars shall be light weighed and uncoupled; awards shall be made within 48 hr. after the time set for closing the bids; whenever possible all scrap shall be loaded to minimum car load switching weights. Several changes proposed in the A.R.A. scrap classification were also accepted with a few modifications.

Leather Belting Now Sold by Thickness

The American Leather Belting Association has decided that, for the greater protection of the consumers of leather belting, it should establish and sell this commodity by specifications of thickness instead of weight. Thus is discarded the old weight terminology of "ounces per square foot" which may be varied by the mere addition of weighting materials to the leather, and does not necessarily always represent a differential in transmission values. This decision was reached after a canvass of belting manufacturers throughout the country, and it is stated that the movement can be considered as having the endorsement of the entire industry.

The thickness specifications now in effect for first quality leather belting are as follows:

Medium single, 10/64 to 12/64 in.
Heavy single, 12/64 to 14/64 in.
Light double, 15/64 to 17/64 in.
Medium double, 18/64 to 20/64 in.
Heavy double, 21/64 to 23/64 in.

1.—All thicknesses in this table are average thicknesses in inches, and should be determined by measuring 20 coils and dividing this value by the number of coils measured. In rolls of belting containing less than 20 coils the average thickness should be determined by measuring one-half of the total number of coils and dividing this value by the number of coils measured.

2.—The classification of "light single" has been eliminated entirely.

3.—Uniformity: No point in either single or double belting shall be more than 2/64 in. thicker or more than 2/64 in. thinner than the average thickness.

4.—The second and third quality brands of each manufacturer bear the same relative thickness to the manufacturer's first quality grades as they did in the past under the old ounces per square foot specification.

These thicknesses are now in effect and should be used by all buyers of belting in wording their orders, states the association's announcement. Every order for single or double should specify the thickness on the order. If just the words "light," "medium," or "heavy" appear on the order these words now mean the thickness as per the above table and not the weight, as formerly.

Mechanical Mfg. Co., Chicago, has been ordered by the Federal Trade Commission to cease and desist the use of the volume of the freight traffic of Swift & Co., or its subsidiary corporations, in the solicitation of railway equipment business from railway companies.



OFF THE ASSEMBLY LINE

Ford Prices Precipitate War for Supremacy in Light Car Field

DETROIT, April 4.

THE action of the Ford Motor Co. in setting a base price of \$460 on its new V-eight car, with the four selling at \$50 under that figure, has precipitated the most momentous price war in the history of the automobile industry. Chevrolet immediately met Ford's low-price challenge by making reductions of as high as \$55 on its six, which now has a base price \$15 under the Ford eight. Hardly had this announcement been published until General Motors made public its decision to lower the Pontiac \$50. At \$495, the new Plymouth is \$35 above the Ford eight and \$50 above the Chevrolet six. The Willys-Overland company has declared that it will not "enter into any price cutting orgy." It is only fair to point out, however, that it was the first company to make a sensational slash when it recently put a base price of \$415 on the Willys-Overland six.

Although the revelation of the new Ford has relieved the tension in Detroit, and the bitter, three-cornered fight in the low-price field between Ford, General Motors and Plymouth has provided this city with the most excitement in months, the steel industry and parts makers have fared poorly. While the mass selling attack of the motor car trade this week is a bold stroke, there is little behind the scenes in the production end of the business to indicate confidence that this attack will accomplish notable results. Ford output is expanding slowly, Chevrolet is tentatively holding back its assemblies until the trend of sales is revealed, and Plymouth is committed for April to a program about on a par with March, when 13,170 cars were turned out. During the entire first quarter Plymouth shipments totaled 18,153 cars, against 7687 in the same period of 1931.

If price is any inducement, car sales should be stimulated by the past week's happenings. The buyer today can get "Pullman car transportation at box car prices," as H. B. Harper, Willys-Overland vice-president, has

Low-price car makers engage in most momentous price war in history of the automobile industry.

* * *

Plymouth shipped 13,170 cars in March and 18,153 in the entire first quarter.

* * *

Chevrolet is to continue indefinitely to build only a six-cylinder car.

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aptly described the situation. The thousands of visitors at Ford exhibits are encouraging evidence of interest, and the General Motors expositions throughout the country have been well attended thus far. Whether this interest will be translated into actual sales will not be known for at least several more days, but it can safely be asserted that the performance of the automobile industry for the remainder of 1932 hinges on the public's response to the current drives of the leading manufacturers. Thus, the steel industry and other metal-working companies should be able to tell within the next week what to expect from Detroit in the coming months.

Ford is said to have had only 1400 cars in the hands of dealers for display purposes on March 31. Production at Rouge is being increased gradually, but still is of only meager proportions. Branch assembly plants continue idle, with no date set for resumption of activities. Employment at Dearborn has risen to 80,000, with about half of that number working five days a week. Ford has given releases to a local wheel maker for 20,000 sets of wheels (100,000 wheels), but is taking only a small number of bodies from Briggs and Murray. The former, however, increased its payroll 59 per cent during March. Ford steel orders have been confined to dribbling amounts, with large releases expected any day.

As predicted in this column several weeks ago, Chevrolet has declared that its "six will be built exclusively for an indefinite period and that at no time has there been thought of changing the present six-cylinder car." This announcement has set at rest the stories circulated in automotive circles that Chevrolet has a four or an eight, or both, which will be introduced shortly to compete with the new Fords. Under the merger arrangement whereby the manufacturing divisions of Chevrolet and Oakland are directed by W. S. Knudsen, production men heretofore affiliated with the former have already taken over direction of the Oakland company's activities, including the purchasing department. Although there may be some drawing in of materials now bought from outside sources, it is regarded as unlikely that suppliers will lose much business as a result of the new set-up. Of chief interest is the fact that General Motors is finding it desirable and necessary to abandon its long-established policy of decentralization, whereby each motor car manufacturing subsidiary was an independent unit. The Buick-Olds-Pontiac Sales Co. in a normal year hopes to dispose of 350,000 units; last year these three divisions, operating separately, sold 223,689 cars. The three factories hereafter will be little more than branch plants, as the sales offices are in Detroit. At each of the Oldsmobile, Pontiac and Buick factories will be a car distributor whose duty it will be to fill the orders turned in by the sales company. Buick-Olds and Chevrolet-Pontiac have as their general managers I. J. Reuter and Mr. Knudsen respectively, both experienced production men, who enter the sales picture only as manufacturers of the cars themselves.

Hupmobile has made price reductions on its six-cylinder cars amounting to as much as \$280 on some models and has added to its line de luxe models in all body types. Continental Motors Corp. will start production of the DeVaux six when new dies are completed by the middle of April.

OBITUARY

EBEN MACBURNY BYERS, chairman of the board of the A. M. Byers Co., Pittsburgh, died in the Doctor's Hospital, New York, on March 31. He was born in Pittsburgh 52 years ago, and began his career with the Byers company in 1902, shortly after his graduation from Yale University. After serving in various capacities, he was made president of the company and had served as chairman of the board since 1925. It was during his incumbency of the recent position that the Byers company developed the Aston process for the manufacture of wrought iron, and built a large plant near Ambridge, Pa., for this purpose. Mr. Byers was the son of the late Alexander MacBurny Byers, founder of the company bearing his name, and one of the most widely known industrialists in the Pittsburgh district. Another son, J. Frederic Byers, is vice-president of the Byers company. Eben M. Byers was also widely known in sporting and philanthropic circles. He won the national amateur golf championship in 1906, and served for a time as president of the National Golf Association. He was also a member of many clubs in Pittsburgh and New York.

* * *

JOHN R. RUSSEL, former president of the Great Lakes Engineering Works, Detroit, died of pneumonia on April 1. He was the son of Dr. George B. Russel, a noted physician of early Detroit and founder of the first iron foundry in that city. After graduation from the University of Michigan, he entered the family firm, the Russel Wheel & Foundry Co., and later was one of the organizers of the Great Lakes Engineering Works, of which he was head until 1920. He was president of the Clayton & Lambert Mfg. Co. of Detroit for a number of years. He was 75 years of age.

* * *

CORNELIUS M. WALSH, president and general manager of the Falls Hollow Staybolt Co., Cuyahoga Falls, Ohio, died of heart disease at his home at that city on March 25, aged 68 years. He was born in Cuyahoga Falls and had spent his entire life there. He was president also of a paper and milling company bearing his name.

* * *

GEORGE NICHOLSON, vice-president and assistant general manager of the Vulcan Iron Works, Wilkes-Barre, Pa., died suddenly in that city on March 15, aged 62 years. He had been identified with the company for over 40 years.

* * *

CLARENCE T. FLETCHER, superintendent of the tube mill of the United States Aluminum Co., New Kensington, Pa., died at his home in that city on March 28, aged 42 years. He was born at Schuyler, Neb., and attended

the Carnegie Institute of Technology, Pittsburgh, from which he was graduated in 1917. Following a brief period in the Navy, he went with the Aluminum company, and had been identified with it in various capacities since that time.

* * *

WILLIAM HALL TUTHILL, vice-president, Tuthill Spring Co., Chicago, died March 31, after an illness of several months. He was born at St. Clair, Mich., in 1853 and in 1880 went to Chicago, where he helped establish the Tuthill company.

* * *

F. T. McDONOUGH, for 27 years with the sales organization of the Niles Tool Works Co., was killed March 27 in an automobile accident in Alabama, while on his way home from a six weeks' vacation in Florida. Mr. McDonough was born in Chicago 41 years ago.

* * *

AARON MANN, president, Mann Iron & Steel Co., Norristown, Pa., died at that city on April 2, aged 40 years.

FRANCIS E. DRURY, one of the founders and former president and chairman of the board of the Perfection Stove Co., Cleveland, died at his winter home in Augusta, Ga., April 3, aged 81 years. Born in Pittsfield, Mass., in 1850, he located in Cleveland in 1870 and was one of the organizers of the Cleveland Foundry Co. in 1888. A few years later the company began the manufacture of oil stoves, which developed into a business of large proportions. Some time ago the company adopted its present name.

* * *

FRANK A. WALSH, pioneer inventor and manufacturer of tin plate products for the canning industry, died at his home in Milwaukee on March 5, aged 85 years. He entered the Civil War at the age of 15 and on his return established a machine shop in Chicago. This was moved to Milwaukee in 1883. Mr. Walsh retired 20 years ago.

* * *

PETER E. STRYKER, traffic manager, Warren Foundry & Pipe Corp., died suddenly at his home in Wharton, N.J., on March 30.

Coal and Coke Tax Is Not Sure of Enactment

WASHINGTON, April 1.—A levy of 10c. per 100 lb., or \$2.24 per gross ton on coal and coke imports placed in the badly emasculated tax bill is far from assured of enactment. It was one of many amendments that were offered in rapid succession in a wrangling and uncontrollable body that had lost all semblance of orderly legislation. The coal and coke tariff was offered by Representative Boland, Democrat, of Pennsylvania. Other Democrats had turned strongly protectionist and offered so-called excise taxes on imports to such an extent that both Democrats and Republicans of the Ways and Means Committee called for a halt on the stampede.

Representative Knudsen, Republican, of Minnesota, offered an amendment to place a tax of 1c. a lb. on the manganese content of imported ore. The amendment was defeated by a vote of 92 to 42.

American Manganese Bronze Co., Holmesburg, Philadelphia, has taken over Caskey Brass & Bronze Works, Inc., Philadelphia, producer of nickel, monel and nickel alloy castings. F. E. Shipley, president of the Caskey company, and other members of that concern's production department will be associated with the succeeding company.

Accuracy in Machining Buick Crankcase

(Concluded from page 830)

turned over and the burrs in the cam bearing removed. Then it goes to a special Buick reaming machine, where the crank bearings are rough and finish bored, the dowel holes in the gear case end and the housing end are drilled and reamed and the rear cam bearings finish reamed. For this operation tungsten-carbide tools are used.

At this point the oil pump hole is core drilled and finish reamed in relation to the cam line on a 24-in. box-column type drill press with a sliding head and plain quill spindle with a spindle speed of 400 r.p.m. The crankcase then moves to an inspector to be checked with various gages. After being checked, it goes to a reciprocating miller for a final milling of the top face. It passes through a washing machine which washes out the cylinder bores. The crankcase then is inspected visually for defects before it is transported to the engine assembly line.

The Porcelain Enamel Institute's second annual meeting will be held Thursday, May 26, at the Hotel Cleveland in Cleveland.

...PERSONALS...

COL. JAMES S. ERVIN has been elected president of the Mackintosh-Hemphill Co., Pittsburgh, according to an announcement by H. V. Blaxter, chairman of the board. Colonel



COL. J. S. ERVIN

Ervin was until recently vice-president and general sales manager of the H. H. Robertson Co., Pittsburgh. F. H. MOYER continues with the Mackintosh-Hemphill Co. as vice-president and senior engineer, and H. E. FIELD remains as vice-president. F. C. T. DANIELS is now chief metallurgist and research engineer. Other officers are DONALD H. BAUM, secretary; W. G. RICE, treasurer, and C. HOWARD PAUL, assistant treasurer.

♦ ♦ ♦

W. J. KERWIN, for many years purchasing agent for the Massey-Harris Co., Ltd., Toronto, Canada, has severed his connection with the company.

♦ ♦ ♦

W. S. WILBRAHAM, who has been in charge of the estimating and order department of Lukensweld, Inc., Coatesville, Pa., has been appointed assistant manager of sales. He was formerly identified with the American Bridge Co. and joined the sales department of the Lukens Steel Co. in 1927.

♦ ♦ ♦

L. G. RUCQUOI, director of the Steel Association of Belgium, Brussels, an organization engaged in developing uses for steel, will arrive in New York this week. He plans to stay about a month, making a survey of steel construction.

♦ ♦ ♦

CHARLES V. FISH has been appointed representative in northeastern Pennsylvania, with office at 515 North Lafayette Street, Allentown,

Pa., for the Reliance Electric & Engineering Co., Cleveland.

♦ ♦ ♦

H. C. DARBY, for the past six years identified with the Kansas City sales force of the Inland Steel Co., Chicago, has been appointed district sales manager. MARK HILL has joined the sales force of that office.

♦ ♦ ♦

F. L. ESTEP, vice-president, Perin Engineering Co., consulting engineer, New York, is sailing on April 8 for India, in connection with certain improvements and additions to the plant of the Tata Iron & Steel Co., for which his company is consulting engineer. He plans to spend some time in England and on the Continent before proceeding to India.

♦ ♦ ♦

GEORGE W. HAMMILL, for the past 13 years with the A. M. Byers Co., Pittsburgh, and who has been in charge of the New York office for many years, has resigned.

♦ ♦ ♦

CUMMINGS C. CHESNEY, retired vice-president of the General Electric Co., has been made a vice-president of the Pittsfield Coal Gas Co., Pittsfield, Mass.

♦ ♦ ♦

F. A. TETZLAFF has been elected secretary-treasurer, Perfex Corp., Milwaukee, manufacturer of automobile and industrial engine cooling radiators, to succeed JOHN W. TAM-



W. J. COOK, head of the galvanizing department of the Wheeling Steel Corp., Wheeling, W. Va., who recently celebrated his fiftieth anniversary in the same department of the Wheeling company.

BERT, who has been appointed manager of the heating division created during the past year. Mr. Tetzlaff will remain in charge of the purchasing department, of which he has been manager for several years.

♦ ♦ ♦

DONALD B. GILLIES was elected president of the Corrigan, McKinney



DONALD B. GILLIES

Steel Co., Cleveland, at a meeting of the directors April 1 to succeed WILLIAM G. MATHER, who became chairman of the board. Mr. Gillies for several years has been senior active vice-president of the company. He became associated with the company about 20 years ago, his first duties having been in connection with the operation of gold mines in Mexico that the company owned at the time. For a number of years he has been in charge of operations of the company's iron ore mines in the Lake Superior district. However, his duties have gradually broadened to other departments of the company's operations. William G. Mather became president of the Corrigan, McKinney Steel Co. two years ago, when that company was acquired by the Cleveland Cliffs Iron Co., of which Mr. Mather is president. Owing to his numerous other interests, Mr. Mather desired to be relieved of the presidency of the Corrigan, McKinney company.

♦ ♦ ♦

KARL GROSS, who has specialized in lead burning, lead coating and homogeneous lead work, has become associated with Northern Blower Co., Cleveland.

♦ ♦ ♦

HENRY A. BUTLER, member of Butler, Wick & Co., investment firm, Youngstown, has been elected a director of the Sharon Steel Hoop Co., Sharon, Pa., filling an old vacancy. All other directors and officers were reelected.

Production of Pig Iron and Ferroalloys in 1931

PRODUCTION of pig iron and ferroalloys in the United States in 1931, as officially reported by the American Iron and Steel Institute, was the lowest, with six exceptions, in this century. Four of these exceptions were the years 1901, 1902, 1903 and 1904, another was 1908 and the sixth was 1921. Last year's total was 18,426,354 gross tons, of which 17,957,779 tons was pig iron and 468,575 tons was ferroalloys. The totals in the other years of low output in this country were as follows:

	Gross Tons	Gross Tons	
1901....	15,878,354	1904....	16,497,633
1902....	17,821,307	1908....	15,936,018
1903....	18,009,252	1921....	16,688,126

The 1931 total shows a reduction of about 42 per cent from that of 1930 and of almost 57 per cent from that of 1929.

Figures compiled by the American Iron and Steel Institute for 1931 follow:

PRODUCTION OF PIG IRON AND FERRO-ALLOYS BY STATES, 1927-1931.

States.	1927	1928	1929	1930	1931
Mass., N.Y., N.J.	2,775,351	2,562,715	3,025,282	2,211,434	1,275,274
Pennsylvania	11,829,599	12,422,602	14,453,251	10,304,886	5,233,224
Maryland	954,763	1,050,876	1,166,204	1,087,866	691,788
Virginia	2,782,993	2,546,009	2,709,881	2,394,725	1,671,205
Alabama	699,514	864,922	864,201	864,824	755,919
West Va., Kentucky	133,785	110,837	138,753	138,753	138,753
Tennessee	8,502,459	9,098,739	9,795,648	6,804,862	4,189,311
Ohio	3,588,595	3,942,412	4,357,971	3,344,674	1,964,735
Illinois	4,201,802	4,588,065	5,085,615	3,934,212	2,327,839
Indiana, Michigan	455,727	339,267	379,162	804,686	317,059
Wisconsin, Minnesota	641,057	634,270	638,015	638,015	638,015
Total, Gross tons	36,565,645	38,155,714	42,613,983	31,752,169	18,426,354
Pig iron	35,858,232	37,401,648	41,757,213	31,020,907	17,957,779
Ferro-alloys	707,413	754,066	856,798	731,262	468,575

PRODUCTION OF PIG IRON AND FERRO-ALLOYS BY STATES, 1930-1931, SHOWING INCREASE OR DECREASE BY STATES.

States.	Production—Gross tons.				
	1931	Per cent.	1930	Per cent.	Decrease
Pig iron:					
Pennsylvania	5,037,672	28.05	9,967,618	32.13	4,929,946
Ohio	4,120,610	22.95	6,688,658	21.56	2,568,048
Indiana, Michigan	2,327,839	12.96	3,934,212	12.68	1,606,373
Illinois	1,964,735	10.94	3,344,631	10.78	1,379,896
Alabama	1,640,851	9.14	2,382,221	7.68	741,370
Mass., New York	1,149,677	6.40	2,008,812	6.48	859,135
Maryland, Virginia, West Va., Ky., Tenn.	1,419,987	7.91	1,922,314	6.20	502,327
Minn., Ia., Colo., Utah	296,408	1.65	772,441	2.49	470,033
Total pig iron	17,957,779	100.00	31,020,907	100.00	13,063,128
Ferro-alloys:					
Pennsylvania	195,552	41.73	337,268	46.12	141,716
New York, New Jersey	125,597	26.81	202,622	27.71	77,025
Ohio, Ill., Ia., Colo., Md., Va., W. Va., Ala., Tenn.	89,352	19.07	148,492	20.31	59,140
Total ferro-alloys	468,575	100.00	731,262	100.00	262,687
Grand total	18,426,354		31,752,169		13,325,815
Pig iron	17,957,779	97.46	31,020,907	97.70	13,063,128
Ferro-alloys	468,575	2.54	731,262	2.30	262,687

*Increase.

PRODUCTION OF HOT, AND WARM BLAST CHARCOAL PIG IRON, GROSS TONS, 1927-1931.

States.	1927	1928	1929	1930	1931
Alabama, Tennessee, Michigan	164,569	142,960	138,193	96,580	46,213

PRODUCTION OF PIG IRON BY GRADES AND FERRO-ALLOYS BY KINDS, 1930-1931, SHOWING DECREASE.

Grades of pig iron and kinds of ferro-alloys.	1931	Per cent.	1930	Per cent.	Decrease	Per cent.
Pig iron:						
Basic	10,174,447	50.66	18,393,384	59.29	8,218,937	44.68
Bessemer and low-phosphorus	4,635,648	25.81	7,314,749	23.58	2,679,101	36.63
Foundry	2,133,939	11.88	3,622,779	11.68	1,488,840	41.10
Malleable	945,664	5.27	1,571,512	5.07	625,848	39.80
Forge	36,482	20	50,690	16	14,214	28.04
All other pig iron	31,599	18	67,787	22	36,188	53.38
Total pig iron	17,957,779	100.00	31,020,907	100.00	13,063,128	42.11
Ferro-alloys:						
Ferro-manganese	234,808	50.11	362,386	49.56	127,578	35.20
Spiegeleisen	211,284	45.09	337,640	46.17	126,356	37.42
Ferro-silicon	22,483	4.80	31,236	4.27	8,753	28.02
Total ferro-alloys	468,575	100.00	731,262	100.00	262,687	35.92
Grand total	18,426,354		31,752,169		13,325,815	41.97

PIG IRON MADE FOR SALE BY GRADES AND BY STATES IN 1931.

States	Basic.	Bess. & low-phos.	Foundry.	Malleable.	Forge	All other pig iron.	Total Gross tons.
Mass., N.Y., Md.	66,185	27,313	359,579	190,384	9,694	653,155	
Pennsylvania	195,358	115,805	211,453	11,836	30,700	565,152	
W.Va., Ala., Ky., Tenn.	36,079	4,088	917,999	3,813	5,656	2,002	969,637
Ohio	446,814	3,712	153,612	287,719	126		891,983
Ind., Illinoia	242,396	15,601	228,335	342,476		1,369	830,177
Mich., Minn., Iowa, Utah	6,195		66,526	13,239		3,824	89,784
Total pig iron	993,027	166,519	1,937,504	819,467	36,482	16,889	3,999,888

States	Ferro-manganese and spiegeleisen.	Ferro-silicon.	All other ferro-alloys.	Total Gross tons.
New York, N. J., Penna.	90,212	120,370	10,187	220,769
Virginia, West Virginia, Tenn.	15,370	90,914	10,040	27,720
Alabama, Ohio, Iowa			2,256	90,860
Total ferro-alloys	105,582	211,284	22,483	339,349

METHODS BY WHICH PIG IRON AND FERRO-ALLOYS WERE CAST OR DELIVERED IN 1931.

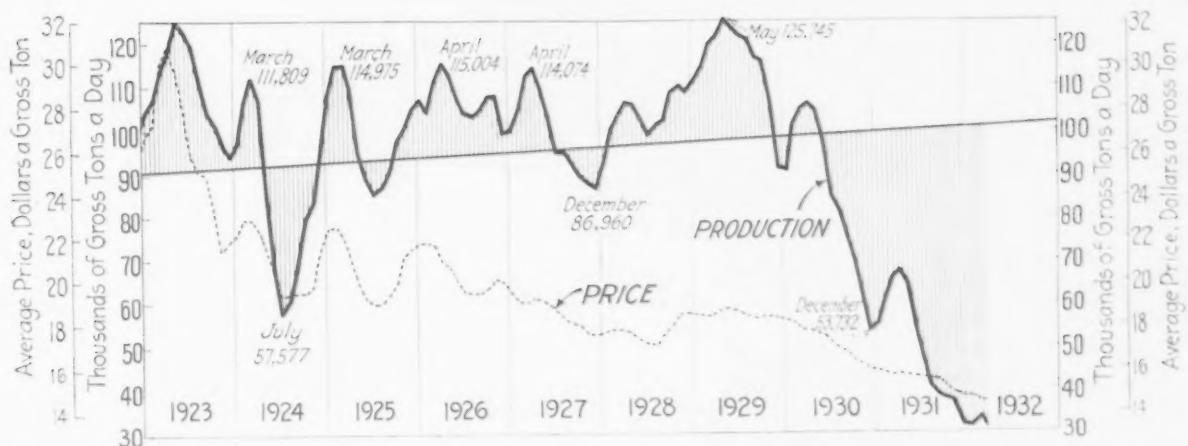
States	Molten condition.	Sand cast.	Machine cast.	Chill cast.	Direct castings.	Total Gross tons.
Mass., N.Y., N.J.	1,077,400	82,738	782,556	8,950	166	1,951,810
Maryland						
Pennsylvania	3,905,382	54,205	1,109,513	162,560	1,564	5,233,224
Virginia, West Va., Ala., Ky., Tenn.	1,193,859	23,251	1,197,641	26,037	1,588	2,442,376
Ohio	3,025,788	9,860	1,148,234		5,429	4,189,311
Ind., Ill., Mich., Minn., Ia., Colo., Utah	2,854,893	39,724	1,710,206		4,810	4,609,633
Total, Gross tons.	12,057,322	209,778	5,948,150	197,547	13,557	18,426,354

HOW BASIC PIG IRON WAS CAST OR DELIVERED IN 1931.

States	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total Gross tons.
Massachusetts, New York	116,448	392,095	508,543
Pennsylvania	657,388	2,419,800	3,077,188
Maryland, West Virginia, Kentucky, Ala.	184,598	1,487,002	1,671,600
Ohio	580,563	1,504,584	2,085,147
Ind., Ill., Mich., Minn., Colo., Utah	831,406	2,000,563	2,831,969
Total	2,370,403	7,804,044	10,174,447

METHODS BY WHICH BESSEMER AND LOW-PHOSPHORUS PIG IRON WERE CAST OR DELIVERED IN 1931.

States	Sand cast, machine cast, chill cast, etc.	Molten condition.	Total Gross tons.
New York, Maryland	27,313	314,120	341,432
Pennsylvania	207,295	1,485,353	1,692,648
West Virginia, Alabama	74,752	59,075	133,827
Ohio	94,675	1,437,467	1,532,142
Indiana, Illinois,			



Daily Pig Iron Output Off in March

PRODUCTION of coke pig iron in March totaled 967,235 gross tons, compared with a February total of 964,280 tons. The March daily rate, at 31,201 tons, showed a loss of 6 per cent from the February figure of 33,251 tons. Total output for the first quarter of this year was 2,904,299 tons, compared with 5,453,135 tons in the corresponding period last year.

Furnaces in operation on April 1 totaled 60, making iron at the rate of 29,135 tons daily, against 64 on March 1, with a daily operating rate of 32,880 tons.

Seven furnaces were blown in during the month and 11 furnaces were blown out or banked.

Four furnaces have been abandoned by the Bethlehem Steel Co.: Furnace C at its Lackawana plant; Cambria D furnace at Johnstown, Pa., and two Worth furnaces, A and C, at Coatesville, Pa. This leaves the total number of available furnaces in the country at 286.

The Steel Corporation started up a Farrell furnace in the Shenango Valley. Among the furnaces it took off was a Joliet furnace, of Illinois Steel, one Carrie, of the Carnegie company, one National Tube furnace and its last in the Ensley group of the Tennessee company. Pittsburgh Steel Co. and the Hamilton Coke & Iron Co. each

put on a furnace. The Republic Steel Corp., Bethlehem Steel Co., Wheeling Steel Corp. and the Woodward Iron Co. each blew one in and took one off. Youngstown Sheet & Tube Co., Shenango Furnace Co., Chateaugay Ore & Iron Co., each blew out or banked one.

Production of Coke Pig Iron and of Ferromanganese

	GROSS TONS		Ferromanganese	
	Pig Iron*		1931	1932
January	1,714,266	572,784	14,251	11,250
February	1,706,621	964,280	19,480	1,010
March	2,032,248	967,235	27,899	4,900
April	2,019,529	—	25,456	—
May	1,924,082	—	23,959	—
June	1,638,627	—	11,243	—
1/2 year	11,105,373	—	122,288	—
July	1,463,220	—	17,776	—
August	1,280,526	—	12,482	—
September	1,168,915	—	14,393	—
October	1,173,283	—	14,739	—
November	1,103,472	—	14,705	—
December	980,376	—	15,732	—
Year	18,275,165	—	212,115	—

*These totals do not include charcoal pig iron. The 1930 production of this iron was 96,580 gross tons.

†Included in pig iron figures.

Daily Average Production of Coke Pig Iron

	GROSS TONS		
	1930	1931	1932
January	91,209	55,299	31,380
February	101,390	60,950	33,251
March	104,715	65,556	31,201
April	106,062	67,317	—
May	104,283	64,325	—
June	97,804	54,621	—
1/2 year	100,891	61,356	—
July	85,146	47,201	—
August	81,417	41,308	—
September	75,890	38,964	—
October	69,831	37,848	—
November	62,237	36,782	—
December	53,732	31,625	—
Year	86,025	50,069	—

Merchant Iron Made, Daily Rate

	1931	Tons	1931	Tons
Jan.	9,416	Sept.	8,985	
Feb.	11,332	Oct.	7,051	
March	11,481	Nov.	5,758	
April	13,439	Dec.	6,778	
May	13,212	1932		
June	11,209	Jan.	6,256	
July	12,012	Feb.	7,251	
Aug.	9,569	March	7,157	

Production by Districts and Coke Furnaces in Blast

	Furnaces	Production (Gross Tons)		Number Operating in Blast	April 1 Tons a Day	March 1 Number Operating in Blast	March 1 Tons a Day
		March 631 Days	February 29 Days				
Buffalo		80,052	77,855	5	2,589	5	2,680
Other New York and Mass.		5,476	6,500	0	—	1	225
New Jersey		—	—	0	—	0	—
Pennsylvania:							
Lehigh Valley*		27,743	28,465	3	895	3	980
Schuylkill Valley		—	—	0	—	0	—
Susquehanna and Lehigh Valleys		11,293	13,966	1	365	1	480
Ferromanganese		—	—	0	—	0	—
Pittsburgh District		178,132	158,979	9	4,600	10	5,600
Ferro and Spiegel		4,906	4,010	1	160	1	140
Shenango Valley		15,350	7,962	1	335	1	500
Western Pennsylvania		20,868	27,917	1	670	1	565
Ferro, and Spiegel		—	—	0	—	0	—
Maryland		36,567	38,936	2	1,180	2	1,340
Wheeling District		79,893	75,240	4	2,575	4	2,600
Ohio:							
Mahoning Valley		81,269	89,686	5	2,560	6	2,700
Central and Northern		79,226	75,849	6	2,665	5	2,615
Southern		20,275	12,866	2	800	1	340
Illinois and Indiana		199,469	202,139	11	6,165	12	7,300
Mich., Wis. and Minn.		24,194	22,082	2	780	2	760
Colo., Mo. and Utah		23,961	22,783	2	770	2	785
Virginia		—	—	0	—	0	—
Kentucky		10,453	8,162	1	340	1	435
Alabama		68,114	90,882	4	1,695	6	2,835
Ferromanganese		—	—	0	—	0	—
Tennessee		—	—	0	—	0	—
Total		967,235	964,280	60	29,135	64	32,880

*Includes spiegeleisen.

†Revised data.

• • E D I T O R I A L

Foreign Steel a Problem for Jobbers

THE low prices at which foreign steel is offered in the principal ports of the United States is creating an acute problem for steel jobbers, particularly those whose policy in the past has been to confine their purchases exclusively or largely to American mills. Whatever their desires may be with respect to buying domestic steel, they are faced with competition from other jobbers who have no compunction about taking advantage of the low offers made on steel from European countries. What to do about the matter is a question that undoubtedly will bring about a spirited discussion at the annual meeting of the American Steel Warehouse Association in New York in May.

Those jobbers who would prefer to deal with American mills are faced with various alternatives. They may refuse to handle foreign steel and perhaps face a further dwindling of their volume, or they may buy foreign steel to the extent that is necessary in order to meet their competition, or they may "pass the buck" to the American mills and ask for prices that would meet the foreign competition as nearly as possible.

This latter proposal, if it were made seriously, probably would evoke no enthusiastic response from the American mills, which are engaged in a determined effort to raise selling prices in order to overcome their huge losses. Yet the problem exists not only for the mills, but for the jobbers, and something probably should be done about it if disastrous effects are not to be visited upon the entire steel industry. The Hawley bill to equalize tariffs on goods from countries whose currencies are depreciated, if passed by Congress, might accomplish some good, but the principal imports are from Belgium, France and Germany, countries that have not departed from the gold standard but which are engaged in fierce competition for foreign markets. These countries and their steel industries are also in serious difficulties. Their exports to Great Britain have been partly shut off by tariffs, and they are seeking new outlets.

Appeals to the patriotism of American buyers probably will be of little avail at this juncture, when every company is fighting for its own salvation and needs every advantage of low costs to keep its goods on the market. Though the individual may do as he pleases as to using foreign products, our Federal, State and local governments, whose revenues are derived from all the people, should be prohibited by law from buying abroad except where such purchases do not compete with our own goods. The Wilson bill requiring United States Government purchases of American goods exclusively is likely to pass Congress. Some States have barred foreign products from public construction projects. New York City is an outstanding example of a municipality which has no such restriction, a condition which is probably due to the lack

of organized efforts in the steel industry to bring about such results.

Forgings and Malleable Castings versus Gray Iron

ANNUAL statistics just issued by the American Iron and Steel Institute show that foundry pig iron production last year was only 11.88 per cent of the total production of pig iron, excluding ferroalloys. That is just about half the proportion shown for quite a period of years up to 1906. The actual tonnage has decreased while total pig iron production underwent a great increase through 1929.

A common view has been simply that gray iron castings have been yielding to rolled steel as methods of pressing and stamping steel were improved, along with quality of steel, lending itself to these forming operations. That, however, is only part of the story, for there has been displacement also by malleable castings and steel forgings.

A survey shows that 1904 and 1905 may be taken as typical of the old order of things as to the proportion of foundry iron to total pig iron, the proportion thereafter decreasing. In those two years foundry iron averaged 21.8 per cent of all pig iron, while last year shows only 11.9 per cent. The malleable iron proportion, however, increased from 2.3 per cent to 5.3 per cent, thus taking up no small part of the slack.

There are no comprehensive statistics of the quantity of steel forged into final form. In 1905, the earliest year of any statistics, only 41,754 tons of blooms and billets was reported, for forging and export combined, while in 1928, the high year, there was 554,475 tons of forging blooms and billets, and the amount of forged iron and steel by rolling mills and steel works reached a maximum of 625,382 tons in 1928. How much duplication there may be in these figures is not known but it is clear that an immense amount of forging is done by others than rolling mills and steel works, which alone report. Much of the forging is done on rolled steel, chiefly bars, reported merely as rolled steel, apart from rolled forging blooms and billets.

THIS significant paragraph appears in the General Electric Company's annual report:

"A manufacturing organization's progress may be measured to some extent by the rapidity of its change in plant, bringing about better methods, improved quality of products and lower costs. With reduced costs come reduced selling prices, followed by increased business and greater use of plant. *When plant value is low on the books, management is more responsive to the introduction of new and better tools.*"

The italics are ours.

COMMENT . . .

Improved Machinery Versus Idle Men

were approached by representatives of the populace with a petition for employment. The engineers said they had power machinery and did not need manual labor. The unemployed men of the countryside were insistent and after some figuring the engineers said they could afford to keep their machinery idle and use the men if they would work for 75 cents a day. They agreed and the work went ahead as it might have done more than a hundred years ago.

Is this the answer to the challenging machine? Are we to have to scrap our high production equipment and return to primitive methods to give everyone work?

Deviations from normal procedure are permissible, if not necessary in abnormal times. Improved machinery may be temporarily sidetracked in order to give employment to hungry and jobless workers. But it should be recognized as a dole and not as a normal principle of sound economics.

It can only be ignorance in the social adaptation of the modern tool to life, that would make us fear the scientific progress which removes much of the drudgery from the production of our essentials. We need first to wholeheartedly welcome the modern high production tool as a most obedient servant and then to use the utmost intelligence in our method of harnessing that servant to our industrial and social needs.

• • •

The Post Office Windows

THE City of Detroit at one time staged a very effective display aimed at the reduction of motor traffic accidents. When a particularly serious accident occurred, the municipality secured the distorted remains of the car and mounted them upon a raised platform adjacent to the traffic point of the happening. A sign called attention to the number of persons killed or seriously injured. One who has seen or participated in a serious accident may exercise special care for a few days thereafter, but the memory and the caution both soon pass away. These more or less permanent reminders of the results of careless driving had a much longer influence upon a much larger number of people.

Sales executives in our steel industries will have the benefit of an even more permanent monument to inefficiency or insufficiency in selling when they visit the big, new post office building in Washington. For here they will find that the lumber industry has secured large

NOT long ago engineers with high production equipment were about to start reconstruction work in the Southern flood area when they

contracts for window trim and other finishings which properly should be made of steel.

The argument may be made that this is a case of poor buying rather than of insufficient selling. An industry as powerful as the steel industry with a product having such outstanding advantages for its application as in this case should not be willing to offer that as an alibi however. The industry needs no alibis; what it does need is intelligent collective market research and cooperation in properly and thoroughly acquainting the public with the advantages of its product as compared with other materials.

The post office windows are important only as straws in the wind. Today's trade winds are blowing away from rugged individualism and the tooth and claw method of selling, or underselling, which it so often implies. They are blowing in the direction of more united action in many things, among which is the intensive study of consumer needs in relation to the industry's products.

• • •

Short Sales as a Sustaining Influence

WE are glad to publish on page 850 an "insider's" defense of short selling of securities. Our readers, in fact the entire American public, have become acutely conscious of the far-reaching effects of the stock market on business in all its ramifications and welcome information regarding exchange operations. But, whether it be desirable or not, they are no longer ready to accept ready-made opinions. They are doing their own thinking and drawing their own conclusions. A contrary policy proved disastrous in the "new era" period.

The argument that short sales are too small in the aggregate to cause price declines but are nevertheless large enough to give the market material support when covering purchases are made is hard to follow. It sounds too much like praising a bully because he lifts up his victim preparatory to knocking him down again.

If short covering is an important sustaining influence "when the panic of those desiring to sell" threatens the very continuance of trading, it is difficult to understand why the short sales themselves do not accentuate the panic of sellers.

Our correspondent holds that the market value of securities is determined only by current earnings of stocks. This point of view is too restricted to coincide with what is generally known about the interdependence of the stock market and business. In the vicious circle of deflation, declining stock prices have depressed business, and reduced business in turn has depressed securities, in an unbroken sequence of cause and effect.

••• LETTERS TO THE EDITOR •••

Short Selling Not a Baneful Influence

Editor, The Iron Age:

THERE has been an attempt to segregate the transactions on the Stock Exchange from a point of view of the ethical purposes actuating those who buy and sell. The author of a recent article on selling short (*THE IRON AGE* of Feb. 25) has attempted to differentiate between the investor, the speculator and the gambler. The investor is defined by him as a "purchaser who expects an annual return on his investment and the eventual return of the principal." The speculator he finds to be one who buys for appreciation "expecting to hold the securities indefinitely." The gambler is one who "purchases the security with the intention of shortly selling it again at an increased price." The first he finds moral. The second somewhat unethical, and the third on a par "with a man who sets fire to a house in order to pick the pockets of the crowd gathered around to watch the conflagration." This, I think, is a very general conception and one which may possibly meet with the approbation of many who read this.

The only difficulty with it is that it isn't true. An investor, as defined by Webster, is one who "lays out money in the purchase of property with the view to obtaining income or profit." The word speculator is derived from the Latin word meaning to observe or to look ahead. He is then one who endeavors to anticipate the value of a security and profit thereby. A gambler "hazards something on a chance."

In point of fact all three of these kinds of buyers and sellers differ only in degree. The investor may buy with the highest intentions of holding indefinitely. He may only desire a return on his capital. He may be satisfied with the eventual return of his principal and no more. He may think that he is taking no chances at all. Yet he may be the veriest kind of gambler for having failed to recognize the chances that he actually takes. The most conservative investor buying the highest grade stock with the best of intentions for carrying it indefinitely in September, 1929, was unwittingly a very foolish gambler. The gambler who iniquitously sold the stock short to him was doing the country a service, as he has subsequently bought it back and supported the market.

Regardless of bull manipulation or short selling, the value of securities in the last analysis is determined by one thing and one only. That thing is the amount of money the stocks earn per share. No optimistic or pessimistic rumors, no holding companies

or juggling of values can escape this fact. The market value of the stock eventually reflects its earnings per share and incidentally the market value of stocks today reflects with fair liberality their current earnings.

But the decline is not popular. The few put the stocks up and everybody prospers. Then everybody wants to sell them at once and who buys? A large proportion of the buyers toward the end of the various decline phases which take place in a bear market are those who borrowed stock and sold it higher up. These are the bears whom it is now proposed to legislate out of existence. They are not a popular group because they represent the few and have made money while the many have lost. They are characterized as gamblers because owing to the desire of many people to sell at once their money has been made quickly; whereas as a matter of fact their judgment of the value of securities is often better than that of those who call themselves investors.

Anyone is unpopular who goes against the crowd, but certainly in this country it is a citizen's inherent right to do so if he so desires. No one is gainsaid the right to borrow money to buy a stock or commodity. It is equally any man's right to borrow that stock or commodity if he desires. In fact, whenever anyone does borrow money on a stock he lends the stock against the money he receives. The transaction is the same with the same ethical implications either way around. The right to borrow stock for sales and delivery is as inherent as the right to borrow money for purchase.

Were it a fact, however, that this selling of borrowed stock, known as short selling, even while a constitutional right of those who see fit to do it, could be shown to work an undue hardship on the majority of security holders, could it be shown to impair the wealth of the country or to embarrass financial transactions generally, it would be desirable to curtail it. In fact, if short selling were a major factor or even a contributing factor in the far-reaching decline which has taken place in security prices it should be prohibited. This, however, is not the case. The detailed and illuminating statistical data collected and published by the New York Stock Exchange show very clearly that short selling as a cause of declines in security prices is a negligible factor. The amount of short selling (by which is meant stock sold and carried short at least over night) taking place in a given period preceding and commencing a decline has been so small in relation to total transactions as to be negligible as a causative factor. The repurchasing of these accumulated short sales has,

however, been of material assistance in supporting the market. It is no exaggeration to say that there have been occasions during the current bear market when the panic of those desiring to sell has been such that were it not for the repurchasing done by the shorts the Exchange would have had to close.

The transactions for the short account are equally beneficial in maintaining an active and liquid market. For it is to the maligned "gambler" who takes the chances for the quicker profits that the long pull investor must look, to sell to him or buy from him his stock. The in-and-out short who sells his stock and covers the same day at times represents as high as 5 per cent of the total transactions. When his daily covering is added to his sales it is easily seen that this contribution amounts to one-tenth of the total shares sold that day. This type of "gambler" will be admitted by all to be innocuous in effect. No one who has ever tried to sell stock and cover it the same day will accuse him of making a big profit or "unduly depressing prices."

In a word, the maligned short seller often has a more acute perception of values than the investor. Instead of depressing prices he is shown to have no effect in causing the decline but a material effect in supporting prices. His trades make a more active market.

The short seller, unpopular now because he has been in a profitable minority, really aids the natural processes of economics rather than impeding them or distorting them. He has a far more logical place in the scheme of things than the bull who inflates security prices to levels far in excess of their intrinsic value. Far from acting *per se* as the chief factor in depressing prices, short operations in many cases act as a support to declining sales and aid in the creation of a ready market. These facts are incontrovertibly shown by published figures.

LANSING MC VICKAR,
East Hampton, N. Y.

Suppress "Bear Raiding," Not Short Selling

Editor, The Iron Age:

In all the discussions on short selling which have come to the attention of the writer, the authors have uniformly taken the position, and stated as facts, that the decline in price in the securities market and the subsequent business depression, were the direct results of short selling. But not once have any of them produced one iota of proof that such was the cause. Mr. Cardullo, in an excellently written article in *THE IRON AGE* of Feb. 25, also falls short of producing the proof.

There are very few activities in this world that are free from evils which

creep in from time to time, and short selling is no exception. No right thinking person can justify "bear raiding," but there are ways of suppressing this and they should be employed. But to condemn short selling in toto which, as the writer sees it, does perform a useful economic service, is like killing the patient to cure the disease!

A study of the history of past periods of pronounced business activity and business depression discloses one characteristic common to all of them, viz.: that they are all started by some fundamental economic force, perhaps to be superseded or assisted by other economic forces, until the movement has attained a momentum sufficient to carry it beyond a point which good judgment or reason would dictate.

Allowing that authorities on the subject are correct, the immediate cause of our late business expansion and the attendant stock market boom was the lowering of the Federal Reserve discount rate at a time when business conditions in this country called for no such step. The resultant easy money market, which obtained for several months following, made possible one of the wildest speculative orgies ever witnessed. Everybody bought stocks regardless of price or value. It has since been stated that, during the early part of 1928, when the Dow-Jones averages for industrial stocks stood at about 195 to 200, as against 380 in September, 1929, some of the largest operators on the New York stock market, thinking prices too high, sold short large amounts of stock, and one big operator as far back as 1925, thinking prices then too high, is reported to have lost a fortune by going short of the market. They all lost heavily, not from misjudging values, but from "bucking" a condition brought about originally by an economic force set in motion.

Experience teaches that any well organized market, free from artificial restrictions, has a more orderly procedure, both up and down, than have markets not so constituted, and the fluctuations in price are not so wide. To cite one example: The end of all real estate booms is complete and permanent collapse. One does not find short sellers identified with real estate speculation.

In September, 1929, the top was reached and we are naturally interested in knowing just what economic forces were at work at that time. We find that interest rates were high. We find on closer inspection that huge sums of working or current funds were being used for capital purposes. We also find that a large part of our exports were being paid for with money which we had loaned. We also find that a large part of the money used to finance this "bull" market was being supplied by industrial concerns all over the land, money which they had got from the public for use in their own business, money

they had got by selling to the public their own stocks at highly inflated prices and money for which they had no more legitimate use than the proverbial cat has for two tails, and this same "legitimate business" which is always decrying speculation in stocks, turns right around and helps to finance the most pernicious and harmful market ever witnessed. These companies lent every possible aid in unloading on a gullible public stocks whose market price discounted for years to come the most favorable developments, and then when it became evident that the thing had been overdone and the storm was close at hand, they withdrew their money—some three billions of dollars—which threw the whole load on the banks. Is it any wonder that a crash followed?

If every purchaser of stocks and every trader in stocks used the same discriminating judgment and was as shrewd a judge of values as the majority of short sellers, such a debacle as occurred in 1928 and 1929 would never be witnessed. It's too bad we have not more short sellers.

The prohibition of short selling on the New York Stock Exchange will mean eventually the closing of that institution. It will mean the freezing of millions upon millions of dollars in the securities market, and it will further mean the probable transfer to a foreign country of the great bulk of our stock transactions, to the great benefit of that country and to our own detriment.

S. G. CLARK.
2314 Greenup St., Covington, Ky.

Measuring Silica in Iron Ore

Editor, The Iron Age:

The article in your issue of February 11, 1932, by Roy P. Hudson, entitled "Ash Is Best Measure of Value of Blast Furnace Coke" was a pleasant surprise to me because it was further recognition of an evaluation of 1 per cent of ash in coking coal, which has now stood the test of over a decade of blast furnace operations. In regard to the evaluation of 1 per cent of silica in iron ores, however, no rule yet published (including Mr. Hudson's statement of "27 lb. additional coke per ton of iron for each 1 per cent increase of silica in the iron ore") has stood the test of actual blast furnace operation. This was brought out in my paper presented before the Blast Furnace and Raw Materials Committee of the American Institute of Mining and Metallurgical Engineers at the February 17, 1932, meeting in New York, entitled "Evaluation of 1 per cent of Silica in Iron Ores."

Mr. Hudson, evidently, has not seen my corrections of the almost universal interpretation of the reported

percentages of silica in Lake Superior iron ores; he quoted my paper on "Beneficiation of Iron Ores" (*Mining and Metallurgy*, September, 1930), in which I had quoted Fayette S. Warner's interpretation of the "Average Analyses of Lake Superior Iron Ores" by W. L. Tinker, secretary, the Lake Superior Iron Ore Association. Mr. Hudson says that "the increase in the average silica content of Lake Superior ore from 1902 to 1928 was 2.20 per cent. He was right as far as he went, but he did not go far enough. The average silica in 1902 was 6.23 per cent (at 212 deg. F.) and 8.43 per cent (at 212 deg. F.) in 1928, a gain of 2.20 per cent (dried at 212 deg. F.); but the decrease of iron content from 55.39 per cent in 1902, to 51.15 per cent in 1928, was in the ore "as received" (natural). The average moisture in the ore in 1902 was only 8.71 per cent, but in 1928, it was 11.37 per cent, so that the actual increase of silica content in the ore as bought was from 5.69 per cent (natural) in 1902, to 7.47 per cent in 1928, a total increase of only 1.78 per cent, instead of 2.20 per cent, as has been generally understood. It is well that this correction be broadcast before any further erroneous deductions are made.

As to Mr. Hudson's "summary and conclusions," I can agree fully in his first conclusion and can partly agree in his fourth and fifth conclusions.

The second conclusion as to "extraneous ash" is contrary to many results obtained in actual practice. Furthermore, extraneous ash is not the same thing as "high-gravity material," as is stated by Mr. Hudson in his first paragraph under "Origin of Ash." The high-gravity material is not all ash, but usually contains considerable fixed carbon and volatile matter. My personal observation of coke being made from the same coal mixtures with low and then higher percentages of high-gravity material, and then observing those cokes used in the same blast furnace, lead me to the conclusion that heavy-gravity material in coking coals is a positive and a cumulative detriment. I believe that if Mr. Hudson would investigate this very important point he would see the injurious effect of heavy-gravity material.

Mr. Hudson's statement that "a coke containing 0.50 per cent sulphur has no more value than a coke containing 1 per cent sulphur" is true only under certain circumstances; if there is a large slag volume 9 or 10 lb. more sulphur would not make much difference. In these days of low coke consumption (below 1600 lb. coke per ton pig iron) the slag volumes are much less than was formerly thought to be good practice, and 700 to 800 lb. is plenty; therefore, there is a premium value for coke with only 0.5 per cent sulphur compared with a coke with 1.0 per cent sulphur.

RALPH H. SWEETSER,
17 Battery Place, New York

Iron and Steel Imports in February Again Decline; Exports Slightly Lower

WASHINGTON, March 29.—Exports of iron and steel from the United States in February were only 40,492 gross tons, a decline of 168 tons from those of January. Imports were 26,738 tons, a drop of 4315 tons under incoming shipments in January.

Exports to Canada in February were 12,226 tons and to Japan, 10,826, a total of 23,052 tons, or nearly 56 per cent of all outgoing shipments. Of the February imports, 7500 tons

came from Belgium, 6189 tons from Germany, and 5253 tons from the Netherlands, of which 4493 tons was pig iron.

Expected heavy imports of tin plate did not make their appearance in February, receipts having been only 26 tons. Merchant steel bar imports were 3195 tons, of which 1731 tons came from Belgium and 1000 tons from Germany. Imports of structural shapes were 2919 tons, of which

1686 tons came from Belgium, 607 tons from France and 534 tons from Germany. Reinforcing bar imports were 2185 tons, of which 1910 tons came from Belgium. The United Kingdom supplied 1376 tons and Canada 1153 tons of the total 2678 tons of ferromanganese imported. Of the 3080 tons of manganese ore imported, 3067 tons were received from the United Kingdom. This was a transhipment said to have originated on the Gold Coast of Africa.

Sources of American Imports of Iron Ore

	(In Gross Tons)		Two Months Ended February		
	February	1932	1931	1932	1931
Chile	43,304	64,466	88,580	176,180	
Cuba	11,000	—	33,000	—	
Spain	—	7,870	—	19,597	
Canada	—	—	38	—	
Russia	17,600	15,050	24,900	35,762	
Sweden	—	6,920	—	6,990	
Other countries	5,650	153	19,567	5,685	
Total	76,954	94,529	166,085	244,215	

Exports of Iron and Steel from the United States

	(In Gross Tons)		Two Months Ended February		
	February	1932	1931	1932	1931
Pig iron	377	606	702	1,025	
Ferromanganese	—	—	13	5	13
Scrap	8,883	10,690	16,453	20,162	
Pig iron, ferroalloys and scrap	9,260	11,309	17,160	21,200	
Ingots, blooms, billets, sheet bar	—	503	183	1,103	
Skelp	2,447	4,944	3,503	12,901	
Wire rods	2,488	3,363	3,576	6,912	
Semi-finished steel	4,938	8,810	7,262	20,616	
Steel bars	1,631	5,190	3,400	9,112	
Alloy steel bars	225	768	270	1,201	
Iron bars	13	124	43	168	
Plates, iron and steel	752	5,571	1,827	7,677	
Sheets, galvanized steel	2,515	5,219	5,120	6,305	
Sheets, galvanized iron	85	433	224	1,150	
Sheets, black steel	2,401	7,447	5,791	16,988	
Sheets, black iron	324	529	499	1,242	
Hoops, bands, strip steel	2,340	3,797	4,203	7,245	
Tin plate, terne plate	2,376	7,701	7,687	14,481	
Structural shapes, plain material	1,381	8,514	2,173	17,848	
Structural material, fabricated	1,109	3,940	2,770	9,100	
Tanks, steel	214	552	372	2,254	
Steel rails	1,893	5,133	3,058	6,397	
Rail fastenings, switches, frogs, etc.	531	446	879	949	
Boiler tubes	260	661	482	1,430	
Casing and off-line pipe	400	2,321	1,515	6,498	
Pipe, black and galvanized, welded steel	2,213	3,621	4,792	8,275	
Pipe, black and galvanized, welded iron	180	193	255	914	
Plain wire	1,045	1,162	1,743	2,670	
Barbed wire and woven wire fencing	1,189	2,179	2,667	4,946	
Wire cloth and screening	44	99	86	164	
Wire rope	191	276	346	524	
Wire nails	476	561	1,678	1,539	
Other nails and tacks	259	291	557	703	
Horseshoes	2	2	25	4	
Bolts, nuts, rivets and washers, except track	263	434	488	939	
Rolled and finished steel	24,352	65,163	52,960	119,312	
Cast iron pipe and fittings	423	2,213	922	3,831	
Malleable iron screwed fittings	132	586	249	1,268	
Car wheels and axles	336	234	480	1,131	
Iron castings	176	651	316	1,048	
Steel castings	126	718	224	1,151	
Forgings	349	806	827	1,596	
Castings and forgings	1,542	5,208	3,618	10,625	
All other	400	670	730	1,316	
Total	40,492	91,161	81,130	182,980	

United States Imports of Pig Iron

	(In Gross Tons)		Two Months Ended February		
	February	1932	1931	1932	1931
India	606	—	3,303	4,157	11,639
United Kingdom	400	—	50	500	100
France	—	—	—	—	25
Germany	—	—	135	—	—
Netherlands	—	—	50	9,732	735
Sweden	—	—	—	98	1,876
Norway	—	—	—	—	51
Belgium	—	—	—	200	—
All others	—	100	53	281	171
Total	—	5,734	3,456	15,103	14,597

Imports of Iron and Steel Products into the United States

	(In Gross Tons)		Two Months Ended February		
	February	1932	1931	1932	1931
Pig iron	5,734	—	3,456	15,103	14,597
Sponge iron	—	—	107	—	20*
Ferromanganese and splegeleisen*	2,678	—	2,497	4,237	6,173
Ferrochromet	—	—	—	39	—
Ferrosilicont	—	12	—	38	305
Other ferroalloys	—	100	149	250	234
Scrap	558	—	415	963	2,129
Pig iron, ferroalloys and scrap	9,082	—	6,662	20,609	24,699
Steel ingots, blooms, billets, etc.	—	16	1,967	1,527	4,220
Wire rods	843	—	1,038	1,829	1,622
Semi-finished steel	859	—	3,005	3,356	5,842
Concrete reinforcement bars	—	2,185	—	3,110	5,613
Hollow bar and drill steel	—	31	—	67	84
Merchant steel bars	3,195	—	3,432	7,012	7,719
Iron bars	—	99	—	34	117
Boiler and other plates	—	—	—	27	30
Sheets, skelp and saw plate	—	2,735	—	2,087	2,995
Tin plate	—	26	—	4	76
Structural shapes	2,919	—	4,341	6,698	11,120
Sheet piling	—	—	90	—	90
Rails and rail fastenings	221	—	450	403	749
Welded pipe	—	288	—	305	692
Other pipe	—	368	—	1,280	570
Barbed wire	1,400	—	403	—	2,725
Round iron and steel wire	232	—	389	—	379
Flat wire and strip steel	—	68	—	63	139
Wire rope and strand	—	129	—	89	268
Other wire	—	73	—	73	157
Hoops and bands	1,896	—	1,248	3,930	2,807
Nails, tacks and staples	797	—	625	1,597	1,161
Bolts, nuts and rivets	—	19	—	92	231
Other finished steel	—	14	—	4	20
Rolled and finished steel	—	16,695	—	18,213	33,542
Cast iron pipe and fittings	—	—	3	—	72*
Castings and forgings	102	—	162	—	28*
Total	—	26,738	—	28,045	57,785
					69,671

*Manganese content only.

†Chromium content only.

‡Silicon content only.

SUMMARY OF THE WEEK'S BUSINESS

Pig Iron Output Lower in March; Steel Business Unimproved

Automobile Takings of Steel Show No Gain—Ford Production

Expanding Slowly—Unusual Public Interest in New Cars

PIG iron production in March fell to the lowest point since August, 1921, the daily rate of 31,201 gross tons having been only a little above the minimum of the 1921 depression, which was 27,889 tons daily in July of that year. Last month's loss, on a daily basis, was more than 6 per cent from February. The February gain was not only erased, but the March rate went 424 tons below that of last December, the previous low month of this depression period.

The loss in steel-making iron during March was almost 8 per cent, thereby confirming the apparent downward trend in steel ingot production. Merchant pig iron fell off only slightly—94 tons a day against 1906 tons a day for steel-making iron. There was a net loss of four furnaces during the month, 60 having been in service on April 1 against 64 on March 1. The Steel Corporation had a net loss of three furnaces, but independent companies gained two, while merchant interests had a net loss of three. In the nadir of the 1921 depression 69 furnaces were in operation, but the rate per furnace then was about 408 tons against 485 tons on April 1 and 514 tons on March 1.

The March total production of coke pig iron was 967,235 gross tons, only slightly above the 964,280 tons of February, although last month had two more working days. In March, 1931, output was 2,032,248 tons. The total for the first quarter of this year was 2,904,299 tons, or almost 47 per cent below the 5,453,135 tons produced during the corresponding period of 1931.

ALTHOUGH conditions still seem to favor some rise in steel production this month, the orders that are being depended upon to bring about such improvement have been delayed. This is particularly true of automobile and railroad tonnage. Pig iron releases for the automobile industry have gained at Cleveland and Detroit, and the Fisher Body plant at Cleveland, after a shutdown of several days, has resumed production with the largest schedule in several weeks. Otherwise, there is no significant change in the automobile situation.

The chief difficulty in the Ford program is the stepping up of production of the eight-cylinder motor, output of which is running only 250 a day, while stocks of parts have been built up considerably in excess of the number of motors available for assembly. It now seems unlikely that volume production can be attained before May 1, in which case sizable steel releases will not be given out until after April 15.

The intense public interest that has been aroused by the automobile industry's spring sales drives may indicate a belated rise in automobile production. More

than 5,600,000 persons visited Ford showrooms on the first day of the public showing of the new cars, while in the first two days of the General Motors exhibits in 55 cities upward of 1,250,000 visitors were registered. In several cities the attendance ran ahead of that at the regular automobile shows earlier in the year.

Payrolls at the Rouge plant and branch assembly plants of the Ford company now total about 100,000 men. First deliveries of the new cars will be made in about two weeks. Orders are on hand for more than 200,000, mostly the eight-cylinder type.

RAILROAD buying is also dilatory. The New York Central, for example, has issued a release of only 2000 tons of rails against its 1931 contract and has not signed a new contract for 30,000 tons, as was expected. Purchases may be confined to small lots from time to time. This road and many others have unused rails lying along rights of way that will be laid before important new orders are placed. The only railroad equipment inquiry is one for 100 steel underframes for the Pacific Fruit Express.

Building construction, which also has been backward, shows signs of improvement. Lettings of structural steel in the week have totaled 17,000 tons, and new work that has come into the market calls for 17,200 tons. Two of the largest new projects are in New York, one an extension of the General Post Office, which calls for 5000 tons of steel, and the other a building for the Insurance Co. of North America, requiring 4800 tons. THE IRON AGE compilation of structural steel awards for March is 66,100 tons, against 40,550 tons in February and 40,100 tons in January.

STEEL ingot production is barely holding at 22 per cent, which was last week's rate. A slight gain has occurred at Cleveland, but the Pittsburgh rate has declined to 20 per cent, with Chicago only a little above that.

Notwithstanding that the higher steel prices for second quarter are firm, not many buyers took advantage of the opportunity to specify against lower-priced first quarter contracts at the end of March. The aggregate of such specifications was surprisingly small, most buyers preferring to await developments. A concession of \$2 a ton has been granted at Cleveland on bars used by drop forgers making automobile parts.

Pig iron has declined 50c. a ton at Chicago, bringing THE IRON AGE composite down to \$14.35 a gross ton from \$14.43 last week. Finished steel is unchanged at 2.087c. a lb. and steel scrap remains at \$8.21 a ton.

▲ ▲ ▲ A Comparison of Prices ▲ ▲ ▲

Market Prices at Date, and One Week, One Month and One Year Previous,
Advances Over Past Week in Heavy Type, Declines in Italics

Pig Iron

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Gross Ton</i>				
No. 2 oily, Philadelphia	\$15.59	\$15.59	\$15.64	\$17.76
No. 2 Valley furnace	15.00	15.00	15.00	17.00
No. 2 Southern, Cincinnati	13.82	13.82	13.82	14.19
No. 2, Birmingham	14.00	14.00	14.00	12.00
No. 2 foundry, Chicago*	16.00	16.50	16.50	17.50
Basic, mid-eastern Pa.	16.00	16.00	16.00	17.25
Basic, Valley furnace	14.50	14.50	14.50	16.50
Valley Bessemer, mid-Pgh.	17.39	17.39	17.39	18.76
Malleable, Chicago*	16.99	16.50	16.50	17.50
Malleable, Valley	15.50	15.50	15.50	17.00
L. S. charcoal, Chicago	23.17	23.17	23.17	25.04
Carburizing base, south-eastern lots	175.00	175.00	175.00	80.00

*The average switching charge for delivery to foundries in the Chicago district is \$1.00 per ton.

*Promulgations quotations adjusted to carload unit; larger quantities at discount.

Rails, Billets, etc.

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Gross Ton</i>				
Rails, heavy, or mill	\$43.00	\$43.00	\$43.00	\$43.00
Light rails, or mill	31.00	31.00	31.00	36.00
Rerolling billets, Pittsburgh	27.00	27.00	27.00	30.00
Sheet bars, Pittsburgh	26.00	26.00	26.00	30.00
Slabs, Pittsburgh	27.00	27.00	27.00	30.00
Forging billets, Pittsburgh	33.00	33.00	33.00	36.00
Wire rods, Pittsburgh	37.00	37.00	37.00	35.00
	Cents	Cents	Cents	Cents
Sheep, grvd, steel, Pgh. 16-ga.	1.50	1.50	1.50	1.55

Finished Steel

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Lb. to Large Buyers</i>				
Bars, Pittsburgh	1.60	1.60	1.50	1.65
Bars, Chicago	1.70	1.70	1.70	1.75
Bars, Cleveland	1.65	1.65	1.65	1.70
Bars, New York	1.95	1.95	1.85	1.98
Tank plates, Pittsburgh	1.60	1.60	1.50	1.65
Tank plates, Chicago	1.70	1.70	1.70	1.75
Tank plates, New York	1.898	1.898	1.798	1.93
Structural shapes, Pittsburgh	1.60	1.60	1.50	1.65
Structural shapes, Chicago	1.70	1.70	1.70	1.70
Structural shapes, New York	1.86775	1.86775	1.76775	1.907
Cold-finished bars, Pittsburgh	2.00	2.00	2.00	2.10
Hot-rolled strips, Pittsburgh	1.40	1.40	1.40	1.55
Cold-rolled strips, Pittsburgh	2.00	2.00	1.90	2.25

On export business there are frequent variations from the above prices. Also, in domestic business, there is at times a range of inches on various products, as shown in our market reports on other pages.

Finished Steel

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Lb. to Large Buyers</i>				
Hot-rolled annealed sheets,				
No. 24, Pittsburgh	2.20	2.20	2.20	2.25
Hot-rolled annealed sheets,				
No. 24, Chicago dist. mill.	2.30	2.30	2.30	2.35
Sheets, galv., No. 24, Pgh.	2.85	2.85	2.85	2.85
Sheets, galv., No. 24, Chicago				
dist. mill.	2.95	2.95	2.95	2.95
Hot-rolled sheets, No. 10, Pgh.	1.55	1.55	1.55	—
Hot-rolled sheets, No. 10, Chi-				
cago dist. mill.	1.65	1.65	1.65	—
Wire nails, Pittsburgh	1.95	1.95	1.95	1.90
Wire nails, Chicago dist. mill	2.00	2.00	2.00	1.95
Plain wire, Pittsburgh	2.20	2.20	2.20	2.20
Plain wire, Chicago dist. mill	2.25	2.25	2.25	2.25
Barbed wire, galv., Pittsburgh	2.60	2.60	2.60	2.55
Barbed wire, galv., Chicago				
dist. mill.	2.65	2.65	2.65	2.60
Tin plate, 100-lb. box, Pgh.	\$4.75	\$4.75	\$4.75	\$5.00

Old Material

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Gross Ton</i>				
Heavy melting steel, Pgh.	\$10.25	\$10.25	\$10.25	\$12.75
Heavy melting steel, Phila.	7.25	7.25	7.37 1/2	10.50
Heavy melting steel, Chicago	7.12 1/2	7.12 1/2	7.12 1/2	10.00
Carwheels, Chicago	7.00	7.00	7.25	9.50
Carwheels, Philadelphia	9.50	9.50	10.50	13.00
No. 1 cast, Pittsburgh	9.50	9.50	9.75	12.50
No. 1 cast, Philadelphia	9.50	9.50	10.00	11.50
No. 1 cast, Chi'go (net ton)	7.00	7.00	7.50	9.50
No. 1 RR. wrot., Phila.	8.50	8.50	8.50	12.00
No. 1 RR. wrot., Chi'go (net)	5.50	5.50	6.50	8.25

Coke, Connellsville

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Net Ton at Oven</i>				
Furnace coke, prompt	\$2.25	\$2.25	\$2.25	\$2.50
Foundry coke, prompt	3.50	3.50	3.50	3.50

Metals

	Apr. 5, 1932	Mar. 29, 1932	Mar. 8, 1932	Apr. 7, 1932
<i>Per Lb. to Large Buyers</i>				
Lake copper, New York	6.12 1/2	6.12 1/2	6.50	10.12 1/2
Electrolytic copper, refinery	5.75	5.75	6.25	9.50
Tin (Straits), New York	19.60	21.20	22.10	25.85
Zinc, East St. Louis	2.80	2.77 1/2	2.80	3.95
Zinc, New York	3.17	3.14 1/2	3.17	4.30
Lead, St. Louis	2.90	2.90	3.05	4.25
Lead, New York	3.00	3.00	3.30	4.50
Antimony (Ashtabula), N. Y.	6.95	6.12 1/2	6.25	7.00

▲ ▲ ▲ The Iron Age Composite Prices ▲ ▲ ▲

Finished Steel

April 5, 1932
One week ago
One month ago
One year ago

2.087c. a lb.
2.087c.
2.037c.
2.128c.

Base on steel bars, beams,
tank plates, wire, rails, black
pipe and sheets. These products
make 87 per cent of the United
States output.

High Low
1932 2.087c., Mar. 29; 2.037c., Jan. 19
1931 2.142c., Jan. 13; 2.052c., Dec. 29
1930 2.362c., Jan. 7; 2.121c., Dec. 9
1929 2.412c., April 2; 2.362c., Oct. 29
1928 2.391c., Dec. 11; 2.314c., Jan. 3
1927 2.453c., Jan. 4; 2.233c., Oct. 25
1926 2.453c., Jan. 5; 2.403c., May 18
1925 2.560c., Jan. 6; 2.396c., Aug. 18

Pig Iron

\$14.35 a Gross Ton
14.43
14.47
15.79

Base on average of basic iron
at Valley furnace and foundry
irons at Chicago, Philadelphia,
Buffalo, Valley and Birmingham.

High Low
\$8.50, Jan. 12; \$8.21, Mar. 22
8.21
8.25
11.08

Based on No. 1 heavy melting
steel quotations at Pittsburgh,
Philadelphia and Chicago.

High Low
\$8.50, Jan. 12; \$8.21, Mar. 22
8.21
8.25
11.08

High Low
\$8.50, Jan. 12; \$8.21, Mar. 22
8.21
8.25
11.08

Pittsburgh Steel Production Again Declines as Business Lags

PITTSBURGH, April 5.—Although specifications for some forms of finished steel products improved slightly last week because of the first quarter's end, tonnage was not sufficient to check declining ingot production, and brought little change to finishing mill schedules. Releases against old contracts were lighter than is usual when a price advance is being made, indicating that consumers are unwilling to accumulate surplus stocks even though they may have to pay more for material bought later.

New contracting is very light, although many steel users have taken requirement contracts at the price levels established during the last month. An exception must be made in the case of the automobile industry, which is still deferring forward purchases until it can get a line on the results of the current sales campaign. A few parts makers have specified steel, which is probably intended for Ford consumption, but no significant buying has been reported. Structural steel and reinforcing bar inquiry continues to expand, although gains are still more noticeable in number of orders rather than volume. Merchant wire products are also slightly more active, and tin plate production has made limited gains. Reestablishment of credit among the canning companies in the near future is expected to bring a rise in tin plate shipments late this month or in early May.

Steel ingot production in the Pittsburgh district is a little lower, now being estimated at 20 per cent of capacity. A steel works blast furnace has been blown out and another banked, leaving only nine active steel company stacks in the district, with one of these on ferromanganese. At least two open-hearth plants are entirely inactive and another is running only one furnace. Steel production by the leading interest is down slightly, but is scheduled to increase next week with the resumption of the rail mill. The leading independent has stepped up production slightly. Increased activity after the middle of the week in the Valleys may increase ingot production there to 25 per cent, but the present rate is little over 20 per cent. Activity in the Wheeling district is off a little.

Pig Iron

Shipments to foundries this month show no improvement over the low March levels and non-integrated steel

Ingot production in the Pittsburgh district has declined to 20 per cent.

Contracting for second quarter very light. Specifications against first quarter commitments also small.

Steel company buys 10,000 tons of heavy melting scrap at unchanged prices.

companies are taking very little basic iron. Roll makers are maintaining consumption rather steadily, but in small quantities. Current prices are holding on the carlot sales which constitute the bulk of current tonnage. Competition of Cleveland furnaces is a factor in this district and in the Valleys.

Semi-Finished Steel

New business is lacking, and shipments show no change from last month. Prices are nominal at \$26 to \$27, Pittsburgh, for billets, slabs and sheet bars.

Rails and Track Supplies

The New York Central will take bids April 7 on angle bars, track spikes, track bolts and tie plates for its 1932 new rail and maintenance requirements. No other important new inquiry has appeared, but specifications for accessories are fairly well maintained. Rail production in the district is expected to increase next week and possibly be sustained throughout the month.

Bars, Plates and Shapes

The end of the quarter drove in some tonnage in heavy hot-rolled products last month for shipment during April. However, releases were much smaller than might be expected at the end of the quarter when a price advance was being put into effect. Structural inquiry is still expanding and includes several small jobs in the Pittsburgh territory. Fabricating shops are engaged at about 30 per cent, and current tonnage is sufficient to maintain this rate. Shipments of

reinforcing bars for road work are growing, and inquiry is broadening. Plates continue very dull, with only the small requirements of miscellaneous manufacturing consumers to take care of. Merchant bars are also quiet, and alloy bars are feeling the effects of reduced purchases by the automobile industry.

The 1.60c. price on bars, plates and shapes is now generally effective, and mills are no longer accepting specifications for shipments against old low-priced contracts.

Tubular Goods

No line pipe orders are reported, although the Southern Counties Gas Co. inquiry at Los Angeles, mentioned last week, is still active. Financing is holding up a number of prospective projects, some of which will probably not go through this year. American mills will not share in the Irak Petroleum Co.'s oil line, which has been placed with European makers. Demand for oil country goods is holding its own, but shows no gain. Standard pipe is very quiet, and tube mills in general are engaged at 15 to 20 per cent.

Wire Products

Business is reflecting seasonal influences, and demand for merchant products is expanding slightly. The rate of specifications from manufacturing consumers shows little change. Prices are well maintained at \$1.95 a keg, Pittsburgh, for nails, and 2.20c., Pittsburgh, for manufacturers' wire.

Sheets

Releases last week showed some improvement, largely because of specifications against low-priced contracts at the end of the quarter. Mills will have until April 30 to ship this material, and production will not be immediately affected. New buying is very light, and no significant tonnage has yet been placed by the automobile industry. Demand from jobbers is particularly quiet, and galvanized material is not moving to the South and West in the increased volume that might be expected at this time of the year.

Prices are still well maintained on new business, and spot orders for immediate shipments are generally bringing the full quotations of 2.20c., Pittsburgh, on hot-rolled annealed sheets; 2.85c. on galvanized; 1.55c. on hot-rolled, and 2.25c. on heavy cold-rolled. Some tonnage of light cold-

rolled, No. 20 gage, and auto body sheets has been booked at the established levels of 2.75c. and 2.90c. respectively.

Tin Plate

The leading interest and one of the larger independents have stepped up their operations slightly in the last week, and the industry as a whole now averages higher than 45 per cent of capacity. However, the rate of specifications is still disappointing for this time of the year, as the larger container makers are awaiting credit stabilization in the canning industry before making commitments.

Strip Steel

Demand shows no change, but strip makers are still expecting improved releases from the automobile industry. The results of the present sales campaign being conducted by the automobile industry are being watched with interest. Significant buying will probably depend on its outcome. The smaller consumers of strip are buying only in small lots and show no indication of increased requirements. Prices are well maintained, with the smaller buyers paying 1.50c. and 1.60c., Pittsburgh, respectively, on the wide and narrow sizes, while the larger users are enjoying the usual \$2 differential. Cold-rolled strip is holding at a flat price of 2c., Pittsburgh.

Coke and Coal

The requirements of foundries using coke seem to be lighter than they have been, and scarcely any movement of the furnace grade is reported. Domestic coke is less active and the Lake cargo movement is not expected to get under way for two or three months. The coal market is equally dull, although railroad requirements show slight seasonal expansion.

Old Material

A large interest has placed orders for about 10,000 tons of heavy melting steel. Prices were the same as on this company's previous purchase, or \$10.25 and \$10.50. Another consumer is reported to have placed some small orders at \$10.25, and this figure has also been reaffirmed as the top of the market on hydraulic compressed sheets. No sales of blast furnace scrap are reported, and the market is unchanged. No. 2 heavy melting steel is off slightly, but dealers are still paying \$8.75 to cover at the principal consuming point. Specialties are quiet. Foundry consumption of scrap is very low. The Pennsylvania Railroad list, closing April 6, contains 19,600 tons of scrap, including 2400 tons of heavy melting steel.

American Zinc Institute, Inc., New York, will hold its annual meeting at Statler Hotel, St. Louis, April 18 to 20.

Foreign Pig Iron Receipts at Philadelphia 11,244 Tons

Most of the Iron Sold at Prices Said to Be Below Eastern Pennsylvania Cost of Production

PHILADELPHIA, April 5.—The second quarter started in without change from the dull conditions that have been prevailing, although there was a temporary impetus in rolling of tonnages that were specified in order to get the benefit of first quarter prices. There was not a marked increase in orders, but the development did apparently indicate to some consumers at least that mills are adhering to higher quotations for the second quarter. The increased levels remain to be tested. So far, however, they may be accepted as the going prices and small lots have been placed at the higher figures. These relate more to plates, shapes and bars than to sheets. As yet neither mills nor body builders in this district have received new business on account of the drive of the automotive industry for business. This is not a matter of surprise, since the new cars have been in the hands of dealers only a few days.

Steel works operations are barely holding at about 15 per cent of capacity.

Pig Iron

Royal Dutch iron totaling 11,224 tons has reached this port, and it is understood a large portion, if not all, of it is for a nearby cast iron pipe maker. It is understood that about 5000 tons of English iron is also about to land here and is for the same pipe maker. Meanwhile, the domestic pig iron producers report that orders are confined to carlots. The imports did not create any particular stir, largely because their arrival had been expected. The prices on these shipments, however, are a matter of concern to domestic furnace interests and are said to be well under the cost of production in this district.

Plates, Shapes and Bars

Mills report that orders coming from miscellaneous sources showed a slight bulge last week. They attributed the increased bookings to consumers' desire to cover at old prices. Makers are apparently quoting uniformly at the new level of 1.60c., Pittsburgh, for the second quarter. The Phoenix Bridge Co. has taken 7500 tons for the Troy-Menands, N. Y., highway bridge. The American Bridge Co. was awarded 3850 tons for the Franklin Memorial in Philadelphia.

Sheets

No new business has as yet come to mills or body makers as the result of the sales drive of the automotive

industry. The move having just been started, however, the trade thinks tonnages will develop soon and give a real stimulus to the market. The higher quotations are being quoted consistently, according to reports, but only light tonnages have been placed for the new quarter. These quotations, Pittsburgh base, are No. 24 galvanized, 2.85c.; No. 10 hot-rolled annealed, 1.70c.; No. 24 hot-rolled and annealed, 2.20c.; No. 10 cold-rolled, 2.20c., and No. 20 cold-rolled, 2.80c.

Warehouse Business

Jobbers report that the second quarter has begun with an increase in orders, though the tonnages are small and scattered. Whether the betterment proves to be only temporary remains to be seen. Prices are unchanged.

Imports

Last week's imports included 11,224 tons of pig iron from the Netherlands, 303 tons from India and 150 tons from England. Forty-nine tons of Spanish iron ore also arrived.

Old Material

Practically no new business is moving. Mills are releasing orders only to meet immediate requirements, which are extremely small. It is reported that foundries are increasing their mixture of scrap with a corresponding reduction in the pig iron melt. Scrap prices are unchanged.

Bethlehem Increases Buffalo Operations

BUFFALO, April 5.—March was the poorest month in pig iron sales in about two years. Operations are unchanged.

Steel

The Lackawanna plant of Bethlehem Steel has increased its operation to nine open-hearths, but two furnaces of the Wickwire Spencer were taken off. Republic Steel started four open-hearths Friday last and will apparently run all this week. A local fabricator has taken 400 tons of structural for a high school at Albion, N. Y.

Old Material

A local mill is understood to have purchased a small tonnage of heavy breakable cast at about \$7.50. Some odd carload sales of steel rails, 3 ft. and under, have been made at \$10.50. Stove plate is scarce.

Chicago Pig Iron Prices Weaken; Ingot Production Lower

Ingot output declines in Chicago district.

* * *

Pig iron prices weaken.

* * *

Steel prices steady and firm.

▼ ▼ ▼

remains dull, but there is a fair amount of new business in track supplies, which are being ordered out more freely. Active inquiries are limited to small lots.

Plates

This market is without life. A few hundred tons of plates will be used for repair work at a southern Illinois oil refinery and some tonnage will be used for 100 underframes for refrigerator cars. Higher prices for crude oil act as a stimulant to the oil industry, but development plans are slow in taking shape.

Structural Material

Fabricators are finding more work on which to bid, but they report that projects are widely scattered and competition is reaching in from greater distances. Private work is almost at a standstill, and from all appearances shops through the Middle West will have to subsist during the spring months on public work. Bridge projects are developing in Iowa, Indiana, Illinois and Nebraska. Contracts are not far distant on post offices at Minneapolis and St. Paul, and a power house addition and a medical arts building are holding fabricators' attention at Duluth. Railroad work is confined to small bridge repairs and an occasional girder span of small tonnage.

Cast Iron Pipe

Sewage disposal and filtration plants at Wilmette, Elgin and Moline, Ill., are holding the attention of cast iron pipe producers in the absence of business requiring large tonnages. Spot carloads are moving in greater number, but the rate is not in keeping with the season of the year. Milwaukee has placed 400 hydrants with a concern in that city.

Bars

The bar market has shown a slight improvement. A road machinery

manufacturer has gone on a 24-hr. a day schedule and a little more business is coming from railroad shops. Releases by automobile manufacturers are growing, but the change is small. Agricultural machinery producers are marking time to gage the effects of their offers to accept farm products in exchange for machinery. Rail steel bar mill operations are irregular as buying remains on a hand-to-mouth basis.

Wire Products

Although here and there a pick-up in demand is noticeable, there is nothing to indicate a sustained growth in consumption, which should be in full swing by this time. Mill stocks are well rounded and, with the slow movement, it has been necessary to reduce output to an average of 25 per cent of capacity. Sellers are not optimistic over the outlook for consumption by the manufacturing trade.

Sheets

This commodity is starting a movement that gives promise of growing. Though orders are not large, the number is increasing and the aggregate tonnage shows gradual expansion. Some hot mills are now starting on Monday, instead of later in the week, and output is averaging better than 30 per cent of capacity. Black sheets used for containers are in greatest use at the moment.

Reinforcing Bars

Some specifications for reinforcing bars for road work have been entered and limited shipments are being made. Trucking on soft roads to construction sites is a handicap at this time of year. Interest in this market is dull in Chicago, but in outlying districts there is some public work. Prices are untested except on road work, where weakness has developed.

Old Material

The tightness in supplies of some grades is well illustrated by the fact that steel mills, though operating at about 22 per cent of capacity, are taking heavy melting steel from yard piles and are pressing dealers for shipments against orders placed at existing low levels. There is little profit to dealers on the tonnage now moving. A surplus of hydraulic sheets is going begging.

CHICAGO, April 5.—Output of steel ingots in this district continues to give ground, the average now being slightly under 22 per cent of capacity. It is difficult at this time to determine what will reverse this trend. Sheet orders are more numerous, but the aggregate tonnage is not large. Road machinery builders are more active, but their use of steel is not heavy at best. Agricultural machinery builders and the automobile industry may give support to the steel industry if sales policies now in effect result in a broadening of public buying. Public works give promise of taking more steel, and shipments of reinforcing bars and mesh for paving work are destined to grow. The railroad pace in the taking of rails and track accessories seems to be well determined for the next few weeks, and there is not much prospect of growth in that time.

Plates, shapes and bars are steady at 1.70c. a lb., Chicago, and sheet and wire quotations are holding. On the other hand, the pig iron market is open to price negotiations between buyer and seller, with the result that quotations are nominal. Supplies of a number of important grades of scrap are lean and, even at low ingot capacity, mills are taking scrap from stock piles and are pressing dealers for shipments against recent contracts.

Pig Iron

Carloads of Northern foundry iron are now readily obtainable at \$16 to \$16.50 a ton, local furnaces. Shipments show no change in volume, but consumers' estimates of April use give promise of improvement. A Michigan consumer is in the market for 100 tons of 8 to 9 per cent silvery. Southern iron is quiet and prices are steady. Charcoal iron is being quoted at \$20 a ton, furnace.

Bolts, Nuts and Rivets

Discounts of 75 per cent off list are being more readily accepted, and there is increasing evidence that prices are firmer. Shipments remain light, with little immediate prospect of improvement.

Rails and Track Supplies

The Omaha lines of the Chicago & North Western have placed 2000 tons of rails and track accessories with Bethlehem Steel Co. The rail market

Cleveland Mills Still Await Orders From Automobile Makers

Fisher Body Plant Increases Schedules—Ingot Output of District Up Slightly at 26 Per Cent

CLEVELAND, April 5.—The steel industry is closely watching the efforts of the leading manufacturers of low-priced automobiles to stimulate spring sales with new models, reduced prices and intensive selling campaigns. Should these drives result in a good volume of car sales, it is expected to be reflected shortly in an increased demand for steel from the motor car industry. Not much business came from the automobile manufacturers during the week. The Ford company is still withholding the placing of round tonnages and has not yet issued additional releases to parts makers in this territory. Production of Chevrolet bodies was increased at the local Fisher body plant this week over the schedule in effect recently.

Steel plant operations in Cleveland increased slightly this week, now being at 26 per cent of ingot capacity. The Otis Steel Co. resumed the operation of two open-hearth furnaces that were down last week, but another producer took off a furnace.

A surprisingly few contract customers came into the market at the end of the month with specifications for bars, plates and shapes against first quarter contracts. Buyers, as a rule, seem to prefer to order steel in volume sufficient for their early needs rather than to stock up with material at the old prices. The market has a firm tone and producers appear determined to hold the new prices. While quite a few contracts have been closed at the higher prices, these have been given little test in actual specifications.

A new development in the price situation is the granting to drop forge shops of a concession of \$2 a ton to 1.55c., Cleveland, for forging bars for the current quarter. It seems to be the intent to make this concession only for bars for motor car forgings.

Pig Iron

The outlook is somewhat more encouraging in that shipping orders for April show a slight gain over those at the start of March. Better releases have come from the motor car industry, but no improvement in the demand is reported from other sources. Activity during the week was light. Consumers are buying only for early needs and sales were in small lots. Prices are unchanged at \$15.50, Cleveland, for foundry and malleable iron for local delivery and \$15 for nearby shipments.

Sheets

With very little new demand from

the motor car industry, the market was dull the past week. New business was confined to small lots. While there has not been much of a test of the new prices as yet, these are being maintained for the little business that is being taken. Although producers quite generally shut off on specifications against first quarter contracts on March 31, large consumers in some cases probably will be allowed to specify against old contracts until April 15. However, producers evidently will adhere to April 30 as the deadline for shipments of sheets bought at prices lower than present quotations. The local Fisher Body plant after a few days' shutdown resumed operations this week on the largest schedule in several weeks.

Strip Steel

The market continues very dull, there being little new business and few releases against old contracts. Hot-rolled strip is firm at 1.40c. to 1.50c., Pittsburgh, for new business.

Valley Steel Mill Operations Rise Slightly; Automobile Releases Not Materially Larger

YOUNGSTOWN, April 5.—Although steel production in the Valleys fell to the lowest levels of the year in the last days of March, mills have entered the new month with some increase in specifications as well as greatly improved sentiment. The automobile industry has not yet increased its releases materially, but Valley steel makers do not expect orders from this source to reach large proportions until the results of the present sales campaign being conducted by that industry have been ascertained. As a result, the improvement in orders noticed at the close of the month came from miscellaneous sources, and to some extent represented specifications against old low-priced contracts prior to advances in quotations on leading finished steel products. Mills will ship this material in April, and, if any further increase in business develops, it will be reflected immediately in the Valley operating rate.

Local pipe mills have not yet noticed any increase in orders, although prospects for pipe demand are not unsatisfactory. Considerable drilling remains to be done in the east Texas

fields, and, if oil prices are maintained at present levels the industry is expected to improve its condition considerably during the next few months. Miscellaneous releases for bars and wire products are holding up rather steadily with further gains in prospect. Shipments in March fell somewhat under February levels, at least in daily rate. Sheets and strip have naturally reflected the recent lack of automobile tonnage. Valley tin mills are scheduled at a slightly higher rate this week, although resumption of production at one large plant will be offset to some extent by reduced schedules in other units of the same company.

Bars, Plates and Shapes

Orders for these products continue light. A few highway bridge projects, requiring only small tonnages of structural steel, have developed. Plans for the Cleveland Post Office may not be out until May. Soft steel reinforcing bars have been nominally quoted at 1.55c., Cleveland, for some time, but this price has been lowered to 1.50c. Merchant steel bars are 1.65c., Cleveland, and plates and shapes are 1.60c., Pittsburgh.

Wire Products

With retailers buying little for stock and the demand from the farmers expected to be light, the usual spring activity in nails and fence is not in evidence.

Old Material

There is no new consumer demand and virtually no scrap is being taken by either Cleveland or Valley district consumers. With no shipping orders, trading between dealers is at a standstill. Prices are nominal.

New York Structural Steel Business Shows Improvement

Awards Are More Numerous and Larger Tonnages Are in the Offing—Other Business Unimproved

NEW YORK, April 5.—Structural steel projects are looming larger in this district both as to numbers and aggregate tonnage. Inquiries are out for 5000 tons for the General Post Office extension, 4800 tons for the Insurance Co. of North America Building, and 750 tons for the first unit of the Knickerbocker City project of the Fred F. French Co.

Miscellaneous buying of steel has not improved. Specifications against expiring first quarter contracts were surprisingly small, and there have been less than the usual number of contracts for the current quarter. Some of the steel companies had larger sales in this district in March than in February, but the improvement was largely traceable to contract specifications in the last two or three days of March, small as these were.

The New York Central Railroad has specified 2000 tons of rails against its 1931 contract, but has signed no new rail contracts, reports to the contrary notwithstanding. New York, New Haven & Hartford has ordered 10,000 tons of rails and has canceled the unshipped portion of its 1931 contract. Board of Transportation, New York, will take bids April 12 on 4097½ tons of rails in 60-lb., 100-lb. and 150-lb. weights. The New York Central will take bids this week on track supplies. The only other prospective railroad buying of importance is 100 steel underframes for the Pacific Fruit Express.

On March 31 the New York Central opened bids on its miscellaneous steel requirements for second quarter. Quotations on plates, shapes, bars, sheets and other products were virtually identical and at the new levels announced as effective for the second quarter on all business. This is the first real test of the new prices in this district.

The pipe for the Irak pipe line in the Persian oil fields, amounting to 120,000 tons or more, has been divided among English, French and German mills, none coming to the United States, although American oil companies have a 25 per cent participation in the project.

Pig Iron

The market continues to lack signs of vigor. Although the opening of the State barge canal is imminent, large movement of iron from Buffalo is not expected to gain momentum until late in the navigation season, owing to the fact that pig iron stocks at Elizabethport and Jersey City are

still of sufficient proportions to satisfy a light demand for the next few months. Bookings in the past week barely aggregated 2000 tons, compared with 2500 tons in each of the two preceding weeks. Prices are unchanged.

Reinforcing Bars

Small-lot orders are being placed at the new base of 1.60c., Pittsburgh, or 1.95c., New York. The absence of large projects, however, precludes a test of the advanced prices. Several construction jobs are in prospect, but specifications for these are slow in taking definite shape.

Old Material

Significant transactions are absent, and prices are nominal. With mill operations still sluggish, shipments are regular.

Cincinnati Pig Iron Business Declines

CINCINNATI, April 5.—Continued low foundry operation is reflected in a slackening of specifications against pig iron contracts. New bookings the past week were less than 700 tons, all in single car lots. Inquiry for substantial coverage is lacking. Quotations on Northern iron continue to be uncertain, but Southern iron is steady. Scrap is featureless.

St. Louis Shipments of Pig Iron Gain in March

ST. LOUIS, April 5.—Shipments against pig iron contracts of the St. Louis Gas & Coke Corp. in March were ahead of those of February, and the outlook is improved. However, very little new business is being placed. The local maker is still quoting \$17.50, f.o.b. Granite City, but is meeting competition in certain territories when necessary.

Steel

Railroads are inquiring for second quarter prices on plates, shapes, bars and sheets. Some specified against first quarter contracts for these items, but the tonnages of these specifications were disappointing. Mills report that specifications for structural shapes have shown some increase on old projects, indicating a belief in the firmness of the price structure.

Old Material

Mills are awaiting orders for finished products before replenishing stocks. Offerings are light. Prices are nominally unchanged. Railroad lists: Nashville, Chattanooga & St. Louis, 9 carloads; New York Central, 58 carloads; Baltimore & Ohio, 3755 gross tons; Pennsylvania, 21,560 net tons.

Alabama Blast Furnace Operations Reduced

BIRMINGHAM, April 5.—March pig iron shipments were about equal to those of February, but short of the January tonnage. The present rate of shipments and bookings varies little from that of the first quarter. Pipe plant operations are no better than in midwinter, ranging from 25 to 30 per cent. The spring season has not yet produced any substantial tonnage. Furnace operations in the district were further curtailed last week when the Tennessee company banked Ensley No. 3, which was on foundry. Only four furnaces are now active, with the Tennessee company, Woodward Iron, Sloss-Sheffield Steel & Iron and the Republic Steel each having one stack in blast. Quotations for Southern deliveries remain on a basis of \$11.

Steel

The reopening of the Ensley rail mill of the Tennessee company, scheduled for April 4, has been deferred, April 18 now being the tentative date, this being dependent on bookings meanwhile. Current steel bookings continue to follow a routine course, with very little activity in any line. One manufacturer had a moderate increase last week for the second week. Sheet shipments increased sharply the last week in March, as customers anticipated their April requirements on account of firmer second quarter prices. Open-hearth operations are unchanged.

Old Material

The demand continues to be negligible. Prices are weak.

New England Pig Iron and Scrap Business Dull

BOSTON, April 5.—A sale of 100 tons of Indian No. 2X iron was the largest pig iron transaction the past week. Otherwise sales ranged from 15 tons to car lots, and in the aggregate again fell well under 1000 tons.

Old Material

Business continues very limited. Prices are unchanged. There is a scarcity of good No. 1 heavy melting steel.

Pacific Coast Business Light; Prices Firmer

SAN FRANCISCO, April 4.—The past week was one of the lightest in recent months in major contracts and in inquiries. Quotations are firmer, both from mills and for resale.

Mill quotations on galvanized and hot-rolled annealed sheets were advanced \$1 a ton for the second quarter, making the schedule 3.50c. and 2.85c. respectively, c.i.f. Pacific Coast ports. The warehouse schedule at Seattle was also adjusted on wire nails. The base is now \$2.85 a keg in less carload lots, whether delivered or f.o.b. warehouse.

Canadian Production Higher in February

TORONTO, April 5.—Production of pig iron, steel ingots and castings and ferroalloys in Canada in February gained. The increase in steel was greater than in pig iron. February output figures and comparisons follow:

	Feb., 1932	Jan., 1932	Feb., 1931
(Gross Tons)			
Pig iron.....	10,507	10,305	46,395
Steel ingots and direct steel castings	28,469	25,060	82,637
Ferroalloys ...	1,431	1,823	4,000

Pipe Lines

Independent Pipe Line Co., subsidiary of Phillips Petroleum Co., Bartlesville, Okla., plans installation of 6-in. welded pipe line from South Oklahoma City to connection with tank farm near Earlsboro, Okla., about 45 miles. Line will have initial capacity of 6,000 bbl. oil daily, later increased to about three times that amount with installation of booster pumping plants and accessory equipment.

San Diego Consolidated Gas & Electric Co., San Diego, Cal., has applied for permission to build about 10 miles of welded steel pipe line, averaging 12½-in., to Rose Canyon district, for connection with main trunk line of Southern Counties Gas Co., Los Angeles, soon to be built for natural gas supply.

Gulf Cities Natural Gas Co., Houston, Tex., plans installation of 2-in. natural gas pipe line in Dickinson Bayou district.

Montreal Light, Heat & Power Co., Montreal, plans extensions in gas distribution pipe lines, near L'Abord-Plouff. Cost about \$40,000.

Milwaukee has accepted bid of Joseph Green-
spur's & Sons Co., St. Louis, to furnish 87,000 ft. of steel pipe at \$11,778.

Freight Rate Decisions

WASHINGTON, April 2.—The Interstate Commerce Commission has denied applications of the Southern Pacific Lines to reduce rail-water rates between Pacific Coast ports in California and New York and Baltimore over their Sunset-Gulf ocean-and-rail route through Galveston or Houston, Tex., to compete with steamship lines operating through the Panama Canal. It was proposed to establish rates about 10 per cent higher than those through the canal.

The Interstate Commerce Commis-

sion has denied an application of railroads to establish a rate of 42c. per 100 lb. on tin and terne plate from Aliquippa, Pa., to Texas gulf ports for export. The rate had been recommended by a committee of the Central Freight Association in order to enable the manufacturer at Aliquippa (Jones & Laughlin Steel Corp.) to compete with manufacturers at Steubenville, Martin's Ferry, Warren and Yorkville, Ohio, from which a rate of 40c. applies.

France Establishes Import Quotas on Steel

WASHINGTON, April 5.—Quotas for the importation of iron and steel blooms, bars and billets, and of hot-rolled hoop-iron and steel into France have been established. The decree is comparatively unimportant so far as the American industry is concerned. It exports but little of these products to France. In 1931 there were no exports of hoop steel, blooms and billets, while steel bar exports were only 18 tons.

By-Product Coke Gained

Production of by-product coke in February was 1,995,780 tons, an average of 68,820 tons a day, representing a gain of 1.5 per cent over the daily average in January, but 33.5 per cent less than in February last year, when the daily rate was 103,495 tons, according to United States Bureau of Mines. Beehive coke production in February amounted to 85,800 tons, or 3432 tons a day, an increase of 1.5 per cent over the daily average in January. Production of all coke in February was 2,081,580 tons, a decrease of 979,000 tons from the output in February, 1931.

Lake Ore Shipments in 1931 Higher in Iron

The average iron content of Lake Superior ore in 1931 showed a slight gain over that shipped during the previous year, but perhaps not as much as might have been expected in view of the fact that there is a tendency to ship a larger percentage of the higher grades of ore in years when the movement is very light. The average content of all grades was 51.53 per cent iron natural as compared with 51.33 per cent during the previous year, according to the annual analysis report of the Lake Superior Iron Ore Association, which includes tables showing analyses of all grades of ore for a 10-year period. In the previous extremely poor shipping year of 1921 the average iron content was 52.07 per cent. The lowest average in a 10-year period was 51.15 per cent in 1928.

Reinforcing Steel

Awards 1150 Tons—New Projects 2300 Tons

AWARDS

Cambridge, Mass., 300 tons, Rindge School superstructure, to Joseph T. Ryerson & Son, Inc.

Boston, 175 tons, State office building, to Concrete Steel Co.

Taunton, Mass., 100 tons, school, to Concrete Steel Co.

Holyoke, Mass., 100 tons, city work, to a local bidder.

Washington, 234 tons, addition to Library of Congress, to Concrete Steel Co.

Cincinnati, 130 tons, addition to tuberculosis hospital, Hamilton County Commissioners to West Virginia Rail Co.

Davenport, Iowa, 100 tons, post office, to an unnamed bidder.

NEW REINFORCING BAR PROJECTS

State of Maine, 125 tons, eight bridges.

Carrollton, Ky., 350 tons, State highway bridges.

Terre Haute, Ind., 200 tons, post office, to submission, bids opened April 6.

Wilmette, Ill., 400 tons, filtration plant.

Moline, Ill., 450 tons, sewage disposal plant and waterworks.

Springfield, Ill., 200 tons, alterations to State Capitol Building.

Clark County, Nev., 235 tons, Virgin River State highway bridge, bids open April 13.

Monterey County, Cal., 138 tons, Rocky Creek State highway bridge, bids open April 20.

Solano County, Cal., 205 tons, Cordelia-Fairfield highway section, bids open April 20.

Phoenix, Ariz., 100 tons, foundations for post office, bids opened on general contract.

Berkeley, Cal., 100 tons, baseball bleachers for University of California.

Cast Iron Pipe

Natick, Mass., awarded 200 tons of 6 and 20-in. to Warren Foundry & Pipe Corp.

Springfield, Mass., purchased 1400 ft. of 8-in. from R. D. Wood & Co.

Bangor, Me., divided 100 tons between Warren Foundry & Pipe Corp. and R. D. Wood & Co.

Mount Vernon, N. Y., awarded 400 tons of 12-in. to Donaldson Iron Works.

Binghamton, N. Y., rejected all bids on 350 tons of 12-in.; new bids to be taken April 11.

Somers, N. Y., will open bids April 9 on 600 tons of 6 to 12-in.

White Plains, N. Y., placed 300 tons of 6-in. and larger with Warren Foundry & Pipe Corp.

Bethlehem, Pa., awarded 400 tons of 6 and 12-in. to Warren Foundry & Pipe Corp.

Santa Barbara, Cal., purchased 100 tons of 4, 6 and 12-in. from American Cast Iron Pipe Co.

Glendale, Cal., awarded 600 tons of 6 and 8-in. Class 250 to R. D. Wood & Co. through Utilities Equipment Co., Los Angeles.

Yakima, Wash., is taking new bids on April 11 for 1426 tons of 16 to 24-in.

Detroit Scrap Quiet

DETROIT, April 5.—Local scrap dealers report that sales the past week were small and consumers are showing slight interest. Prices are unchanged.

Fabricated Structural Steel

Bookings the Third Largest Total for the Year—New Projects Also in Good Volume

WITH the Troy-Menands bridge requiring 7500 tons and the Franklin Memorial, Philadelphia, 3850 tons, the volume of fabricated steel awards for the week calls for 17,000 tons. This compares with 19,200 tons March 3, which was the largest total for any week this year, and 17,175 tons the week of Jan. 21. In the Central West a bridge at De Pere, Wis., will take 1600 tons. New inquiries are larger at 17,200 tons. Projects include 5000 tons for an extension to the General Post Office in New York, 4800 tons for the Insurance Co. of America Building, New York, and 1000 tons for a high school in Scranton, Pa.

Contracts in March totaled 66,100 tons, compared with 40,550 tons in February and 40,100 tons in January. Awards follow:

NORTH ATLANTIC STATES

Taunton, Mass., 100 tons, high school, to John E. Cox, Fall River, Mass.
Troy-Menands, N. Y., 7500 tons, highway bridge, to Phoenix Bridge Co.
Albion, N. Y., 500 tons, high school, to Lackawanna Steel Construction Co.
Philadelphia, 3850 tons, Franklin Memorial Institute and Museum, to American Bridge Co.
St. Nicholas, Pa., 850 tons, steam generating plant for Philadelphia & Reading Coal & Iron Co., to Ingalls Iron Works.

THE SOUTH

Crockett County, Tex., 100 tons, highway bridge, to North Texas Iron & Steel Co.
Long View, Tex., 300 tons, Court House, to Petroleum Iron Works Company.

CENTRAL STATES

Battle Creek, Mich., 800 tons, auditorium, to a Detroit fabricator.
Battle Creek, Mich., 650 tons, junior high school, to R. C. Mahon Co.

Hammond, Ind., 160 tons, Lever Brothers Co. plant, to Hansell-Elcock Foundry Co.

DePere, Wis., 1600 tons, State highway bridge, to American Bridge Co.

Sioux Falls, S. D., 100 tons, auditorium, to Hassenstein Iron Works.

Cleveland, 140 tons, West Side Masonic Temple, to Fort Pitt Bridge Works Co.

WESTERN STATES

Salinas, Cal., 100 tons, State armory, to Moore Dry Dock Co.; previously reported to Palm Iron Works.

NEW STRUCTURAL STEEL PROJECTS

NORTH ATLANTIC STATES

Anson, Me., 125 tons, State bridge.
Nyack, N. Y., 150 tons, post office.
New York, upward of 5000 tons, General Post Office extension; bids to be taken soon.
New York, 4800 tons, Insurance Co. of North America building; restricted number of bidders to be invited to figure.
New York, 750 tons, 12-story building, Unit No. 1 of Fred F. French Co. Knickerbocker City project.

New York, 385 tons, garage for Marks Brothers, Teaneck, N. J., 250 tons, St. Anastasia school and auditorium.

Scranton, Pa., 1000 tons, high school.

Clinton, N. Y., 500 tons, Clinton Central school.

State of New York, 500 tons, highway bridges.

Newark, N. J., 8000 tons, post office; previous bids rejected.

Philadelphia, 735 tons, garage for Philadelphia Savings Funds Society.

Torrance, Pa., 175 tons, building for Pennsylvania Department of Welfare.

Warren, Pa., 375 tons, buildings for Pennsylvania State Hospital.

Pittsburgh, 200 tons, repairs to Panther Hollow Bridge in Schenley Park.

Baltimore, 150 tons, building for Harlem Theater Corp.

Norfolk, Va., 525 tons, Professional Arts Building.

THE SOUTH

Galveston, Tex., 350 tons, United States immigration station.

CENTRAL STATES

Wilmette, Ill., 300 tons, filtration plant.
Wabash Railroad, 250 tons, bridges.

Wood River, Ill., 250 tons, Standard Oil Co.
Central City, Neb., 400 tons, Chapman bridge over Platt River.

FABRICATED PLATE

AWARDS

Galveston, Tex., 450 tons, dredge hull for United States Engineer, to Ingalls Iron Works.

NEW PROJECTS

Vernon, Cal., 400 tons, municipal waste boilers; Consolidated Steel Corp., low bidder.

Statue Island, N. Y., 105 tons, bell buoys for Department of Commerce; Pennsylvania Engineering Co., low bidder.

patent, pertaining to multiple "V" belt drives has been settled out of court. The Dayton Rubber Mfg. Co. takes a license under the Geist patent and the Allis-Chalmers Mfg. Co. has the right to operate under the Short patent, if it so desires.

* * *

Worcester Branch, National Metal Trades Association, at its annual meeting, March 23, elected officers as follows: President, Fred S. Morton, Matthews Mfg. Co., Worcester; vice-president, F. A. Ball, L. S. Starrett Co., Athol; treasurer, William Arter, Arter Grinding Machine Co., Worcester; secretary, Donald Tulloch, Worcester.

* * *

Gray Iron Institute will hold a mid-year meeting at Hotel Statler, Detroit, May 3, during the convention of the American Foundrymen's Association.

* * *

Production of babbitt metal in February was 1,577,017 lb., against 1,743,837 lb. in January, according to reports received by the Bureau of the Census from 40 manufacturers.

News in Brief

The open-hearth committee of the American Institute of Mining and Metallurgical Engineers will hold its spring open-hearth conference at the Ohio Hotel, Youngstown, on May 23 and 24. L. F. Reinartz, American Rolling Mill Co., Middletown, Ohio, is chairman of the committee.

* * *

The American Society for Testing Materials will hold its 1933 annual convention in Chicago at some time during the last two weeks of June, the exact dates to be arranged later. This decision has been reached by the executive committee and was influenced partly by the fact that the Century of Progress Fair will be held in Chicago beginning June 1, 1933.

* * *

Canadian General Electric Co., Ltd., has completed the installation of a porcelain enameling plant in its Peterboro, Ont., factory for the enameling of electric refrigerators. The refrig-

erators are being manufactured completely in the Peterboro factory. All enameling equipment was made in Canada and was supplied by the Ferro Enameling Co. of Canada, Ltd., Ottawa, Ont., a branch of the Ferro Enamel Corp., Cleveland.

* * *

At the fifteenth annual meeting of Electric Hoist Manufacturers Association in New York March 17, William White, Euclid-Armington Corp., Euclid, Ohio, and Donald B. Patterson, Harnischfeger Sales Corp., Milwaukee, were elected chairman and vice-chairman respectively to serve until April 1, 1933. The association will hold its next meeting in Detroit in the first week of May.

* * *

Allis-Chalmers Mfg. Co. announces that the suit between it and the Dayton Rubber Mfg. Co., Dayton, Ohio, in the United States District Court at Cincinnati involving patent infringement of Allis-Chalmers Geist

Prices of Finished and Semi-Finished Steel, BARS, PLATES, SHAPES

Iron and Steel Bars

Soft Steel

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
Del'd Philadelphia	1.91c.
Del'd New York	1.95c.
Del'd Detroit	1.80c.
F.o.b. Cleveland	1.65c.
F.o.b. Lackawanna	1.70c.
F.o.b. Birmingham	1.75c.
C.i.f. Pacific ports	2.00c.

Billet Steel Reinforcing

	Base per Lb.
F.o.b. Pgh mills, 40, 50, 60-ft.	1.50c. to 1.60c.
F.o.b. Birmingham, mill lengths	1.75c.

Rail Steel

	Base per Lb.
F.o.b. mills, east of Chicago dist.	1.30c. to 1.35c.
F.o.b. Chicago Heights mills	1.50c. to 1.60c.

Iron

	Base per Lb.
Common iron, f.o.b. Chicago	1.70c.
Refined iron, f.o.b. Pgh mills	2.75c.
Common iron, del'd Philadelphia	2.11c.
Common iron, del'd New York	2.15c.

Tank Plates

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Chicago	1.70c.
F.o.b. Birmingham	1.75c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.7935c.
F.o.b. Contesville	1.70c.
F.o.b. Sparrows Point	1.70c.
F.o.b. Lackawanna	1.70c.
Del'd New York	1.898c.
C.i.f. Pacific ports	1.85c.

SHEETS, STRIP, TIN PLATE, TERNE PLATE

Sheets

Hot-rolled

	Base per Lb.
No. 10, f.o.b. Pittsburgh	1.55c.
No. 10, f.o.b. Chicago mill	1.65c.
No. 10, del'd Philadelphia	1.86c.
No. 10, f.o.b. Birmingham	1.70c.
No. 10, c.i.f. Pacific Coast ports	2.30c.

Hot-Hoiled and Annealed

	Base per Lb.
No. 10, Pittsburgh	1.70c.
No. 10, Chicago mills	1.80c.

Hot-Rolled Annealed

	Base per Lb.
No. 24, f.o.b. Pittsburgh	2.20c.
No. 24, f.o.b. Chicago mills	2.30c.
No. 24, del'd Philadelphia	2.46c. to 2.51c.

Heavy Cold-Rolled

	Base per Lb.
No. 10 gage, f.o.b. Pittsburgh	2.25c.
No. 10 gage, f.o.b. Chicago mills	2.35c.

Light Cold-Rolled

	Base per Lb.
No. 20 gage, f.o.b. Pittsburgh	2.75c.
No. 20 gage, f.o.b. Chicago mills	2.85c.

	Base per Lb.
No. 20 gage, del'd Philadelphia	3.06c.

	Base per Lb.
No. 20, f.o.b. Pittsburgh	2.90c.

Automobile Body Sheets

	Base per Lb.
No. 20, f.o.b. Pittsburgh	2.90c.

Welded Pipe

Base Discounts, f.o.b. Pittsburgh District
and Lorain, Ohio, Mills

Butt Weld

Steel	Black	Galv.	Iron	Black	Galv.
1/8	47	21 1/2	1/4 and 3/8	+9	+34
1/4 to 5/8	53	27 1/2	1/4	25	7
1/2	58	44 1/2	3/4	30	13
5/8	62	50 1/2	1 and 1 1/4	33	17
1 to 3	64	52 1/2	1 1/2 and 2	37	20

Lap Weld

Steel	Black	Galv.	Iron	Black	Galv.
2	57	45 1/2	2	25	11
2 1/2 to 6	61	49 1/2	2 1/2 to 3 1/2	30	15
7 and 8	58	45 1/2	4 to 6	32	19
9 and 10	56	43 1/2	7 and 8	31	18
11 and 12	55	42 1/2	9 to 12	28	13

Steel	extra	strong, plain ends	Iron	Black	Galv.
1/8	43	26 1/2	1/4 and 3/8	+11	+46
1/4 to 3/8	49	32 1/2	1/2	25	9
1/2	55	44 1/2	3/4	30	14
5/8	60	49 1/2	1 to 2	36	20
1 to 1 1/2	62	51 1/2			
2 to 3	63	52 1/2			

Steel	extra	strong, plain ends	Iron	Black	Galv.
2	55	44 1/2	2	31	15
2 1/2 to 4	59	48 1/2	2 1/2 to 4	36	22
4 1/2 to 6	58	47 1/2	4 1/2 to 6	35	21
7 to 8	54	41 1/2	7 and 8	33	19
9 and 10	47	34 1/2	9 to 12	23	10
11 and 12	46	33 1/2			

On carloads the above discounts on steel pipe are increased on black by one point, with sup-

Structural Shapes

	Base per Lb.
F.o.b. Pittsburgh mill	1.60c.
F.o.b. Birmingham	1.75c.
F.o.b. Lackawanna	1.70c.
F.o.b. Bethlehem	1.70c.
Del'd Cleveland	1.8035c.
Del'd Philadelphia	1.6495c.
Del'd New York	1.86775c.
C.i.f. Pacific ports (standard)	2.00c.
C.i.f. Pacific ports (wide flange)	2.10c.

Steel Sheet Piling

	Base per Lb.
F.o.b. Pittsburgh	1.90c.
F.o.b. Chicago mill	2.05c.
F.o.b. Buffalo	2.00c.

Alloy Steel Bars

(F.o.b. maker's mill)	
Alloy Quantity Bar Base	2.65c. per Lb.
Series	
Numbers	
2000 (1 1/2% Nickel)	\$0.25
2100 (1 1/2% Nickel)	0.55
2300 (3 1/2% Nickel)	1.50
2500 (5% Nickel)	2.25
3100 Nickel Chromium	0.55
3200 Nickel Chromium	1.35
3300 Nickel Chromium	3.80
3400 Nickel Chromium	3.20
4100 Chromium Molybdenum (0.16 to 0.20 to 0.25% Molybdenum)	0.50
4100 Chromium Molybdenum (0.25 to 0.30% Molybdenum)	0.40

4600 Nickel Molybdenum (0.20 to 0.30% Molybdenum, 1.50 to

Bolts, Nuts, Coke, Coal, Fuel Oil, Cast Iron Pipe

WIRE PRODUCTS

To Jobbing Trade

Base per Keg

Standard wire nails	\$1.95
Smooth coated nails	1.95
Galvanized nails	3.95

Base per Lb.

Smooth annealed wire	2.35c
Smooth galvanized wire	2.80c
Polished staples	2.50c

Galvanized staples	2.75c
Barbed wire, galvanized	2.60c
Woven wire fence, No. 9 gage, per net ton	\$55.00
Woven wire fence, No. 12½ gage and lighter, per net ton	60.00

Chicago and Anderson, Ind., mill prices are \$1 a ton over Pittsburgh base; Duluth, Minn., and Worcester, Mass., mill \$2 a ton over Pittsburgh, and Birmingham mill \$3 a ton over Pittsburgh.

RAILS AND TRACK SUPPLIES

Track Equipment

Base per 100 Lb.

Spikes, $\frac{1}{2}$ -in. and larger	\$2.60
Spikes, $\frac{1}{2}$ -in. and larger	2.60
Spikes, boat and barge	2.80

Tie plate, steel	1.85
Angle bars	2.75
Track bolts, to steam railroads	3.50
Track bolts, to jobbers, all sizes, per 100 count	73 per cent off list

BOLTS, NUTS, RIVETS AND SET SCREWS

Bolts and Nuts

(F.o.b. Pittsburgh, Cleveland, Birmingham or Chicago)

Per Cent Off List

Machine bolts	75
Carriage bolts	75
Lag bolts	75
Flow bolts, Nos. 1, 2, 3 and 7 heads	75
Hot-pressed nuts, blank or tapped, square	75
Hot-pressed nuts, blank or tapped, hexagons	75
C.p.c. and t. square or hex. nuts, blank or tapped	75
Washers*	7.00c. to 6.75c. per lb. off list

*F.o.b. Chicago, New York and Pittsburgh.
Bolts with rolled thread up to and including $\frac{1}{2}$ in. x 6 in. take 10 per cent lower list prices.

Bolts and Nuts

Per Cent Off List

Semi-finished hexagon nuts	75
Semi-finished hexagon castellated nuts, S.A.E.	75
Stove bolts in packages, P'gh.	85 and 10
Stove bolts in packages, Ch'go.	85 and 10
Stove bolts in pkgs., Cleveland	85 and 10
Stove bolts in bulk, P'gh.	85, 10 and 2½
Stove bolts in bulk, Chicago	85, 10 and 2½
Stove bolts in bulk, Cleveland	85, 10 and 2½
Tire bolts	60 and 10

Discount of 75 per cent off on bolts and nuts applies on carload business with jobbers and large consumers.

Large Rivets

$\frac{1}{2}$ -in. and larger

Base per 100 Lb.

F.o.b. Pittsburgh or Cleveland	\$2.25
F.o.b. Chicago	2.35

Small Rivets

$\frac{1}{4}$ -in. and smaller

Per Cent Off List

F.o.b. Pittsburgh	70, 10 and 5
F.o.b. Cleveland	70, 10 and 5
F.o.b. Chicago	70, 10 and 5

Cap and Set Screws

(Freight allowed up to but not exceeding 50c. per 100 lb. on lots of 200 lb. or more)

Per Cent Off List

Milled cap screws	80, 10, 10 and 5
Milled standard set screws, case hardened	80 and 5
Milled headless set screws, cut thread	75 and 10
Upset hex. head cap screws, U.S.S.S. thread	80, 10 and 10
Upset hex. cap screws, S.A.E. thread	85, 10 and 10
Upset set screws	89, 10 and 5
Milled studs	70

SEMI-FINISHED STEEL

Sheet Bars

(Open-Hearth or Bessemer)

Per Gross Ton

Pittsburgh	\$26.00
Youngstown	26.00
Cleveland	26.00

Slabs

(8 in. x 2 in. and under 10 in. x 10 in.)

Per Gross Ton

Pittsburgh	\$26.00 to \$27.00
Youngstown	26.00 to 27.00
Cleveland	26.00

Skelp

(F.o.b. Pittsburgh or Youngstown)

Per Lb.

Grooved	1.50c. to 1.60c.
Universal	1.50c. to 1.60c.
Sheared	1.50c. to 1.60c.

Wire Rods

(Common soft, base)

Per Gross Ton

Pittsburgh	\$37.00
Cleveland	37.00
Chicago	38.00

COKE, COAL AND FUEL OIL

Foundry, Birmingham

5.00

Foundry, by-products, St. Louis

8.00

Foundry, by-products, del'd St. Louis

9.00

Coal

Per Net Ton

Mine run steam coal, f.o.b. W. Pa. mines

\$1.40 to \$1.50

Mine run coking coal, f.o.b. W. Pa. mines

1.50 to 1.60

Gas coal, $\frac{3}{4}$ -in., f.o.b. Pa. mines

1.70 to 1.80

Mine run gas coal, f.o.b. Pa. mines

1.50 to 1.60

Steam slack, f.o.b. W. Pa. mines

0.40 to 0.60

Gas slack, f.o.b. W. Pa. mines

0.65 to 0.75

Fuel Oil

Per Gal. f.o.b. Bayonne, N. J.

No. 3 distillate	4.00c.
No. 4 industrial	3.50c.

Per Gal. f.o.b. Baltimore

No. 3 distillate	3.50c.
No. 4 industrial	3.25c.

Per Gal. f.o.b. Chicago

No. 3 industrial fuel oil	2.75c.
No. 5 industrial fuel oil	2.60c.

Per Gal. f.o.b. Cleveland

No. 3 industrial fuel oil	4.62½c.
No. 4 distillate	3.87½c.

REFRACTORIES

Fire Clay Brick

Per 1000 f.o.b. Works

High-heat Intermediate

Duty Brick Duty Brick

Pennsylvania	\$38.00	\$25.00 to \$30.00
Maryland	38.00	25.00 to 30.00
New Jersey	\$44.00 to 57.00	
Ohio	38.00	25.00 to 30.00
Kentucky	38.00	25.00 to 30.00
Missouri	35.00	30.00

Per Net Ton	
High-heat	
Intermediate	
Duty Brick	

High-heat	
Intermediate	
Duty Brick	

Chrome Brick

Per Net Ton

Standard size

\$42.00

Silica Brick

Per 1000 f.o.b. Works

Pennsylvania

\$38.00

Chicago

47.00

Illinois

38.00 to 30.00

Pig Iron Prices for All Districts

VALLEY

Per gross ton, f.o.b. Valley furnace:	
Basic	\$14.50
Bessemer	15.50
Gray forge	15.00
No. 2 foundry	15.00
No. 3 foundry	14.50
Malleable	15.50
Low phos., copper free	25.00

Freight rate to Pittsburgh or Cleveland district, \$1.89.

PITTSBURGH

Per gross ton, f.o.b. Pittsburgh district furnace:	
Basic	\$15.00
No. 2 foundry	16.00
No. 3 foundry	15.50
Malleable	16.00
Bessemer	16.00

Freight rates to points in Pittsburgh district range from 69c. to \$1.26.

CHICAGO

Per gross ton at Chicago furnace:	
N'th'n No. 2 fdy.	\$16.00 to \$16.50
N'th'n No. 1 fdy.	16.50 to 17.00
Malleable, not over 2.25 sll.	16.00 to 16.50
High phosphorus	16.00 to 16.50
Lake Super. charcoal, sll.	
1.50, by rail	23.17
S'th'n No. 2 fdy.	16.14
Low phos., sll. 1 to 2, copper free	\$28.50 to 29.20
Silvery, sll. 8 per cent	23.67
Bess. ferrosilicon, 15 per cent	28.92

Prices are delivered consumers' yards except on Northern foundry, high phosphorus and malleable, which are f.o.b. local furnaces, not including a switching charge.

ST. LOUIS

Per gross ton at St. Louis:	
No. 2 fdy., sll. 1.75 to 2.25, f.o.b.	
Granite City, Ill.	\$17.50
Malleable, f.o.b. Granite City	17.50
N'th'n No. 2 fdy., del'd St. Louis	18.80
Southern No. 2 fdy., del'd.	\$14.50 to 15.50
Northern malleable, del'd.	18.80
Northern basic, del'd.	18.80

Freight rates 83c. (average) Granite City to St. Louis; \$2.30 from Chicago; \$4.56 from Birmingham.

NEW YORK

Per gross ton, delivered New York district:	
*Buffalo, No. 2, del'd east.	\$17.91 to \$18.41
N. J.	17.91 to 18.41
East. Pa. No. 2 fdy.	16.52 to 17.02
East. Pa. No. 2X fdy.	17.02 to 17.52

Freight rates: \$1.52 to \$2.63 from eastern Pennsylvania.

*Prices delivered to New Jersey cities having rate of \$3.41 a ton from Buffalo.

BUFFALO

Per gross ton, f.o.b. furnace:	
No. 2 fdy.	\$16.00
No. 2X fdy.	16.50
No. 1 fdy.	17.50
Malleable, sll. up to 2.25	16.50
Basic	15.50
Lake Superior charcoal, del'd.	23.41

NEW ENGLAND

Per gross ton delivered to most New England points:	
*Buffalo, sll. 1.75 to 2.25	\$19.54 to \$20.04
*Buffalo, sll. 2.25 to 2.75	19.54 to 20.04
*Ala. sil. 1.75 to 2.25	19.74
*Ala. sil. 2.25 to 2.75	20.24
†Ala. sil. 1.75 to 2.25	15.88
†Ala. sil. 2.25 to 2.75	16.28

Freight rates: \$5.04 all rail from Buffalo; \$9.75 all rail from Alabama and \$5.88 rail and water from Alabama to New England seaboard.

*All rail rate.

†Rail and water rate.

CINCINNATI

Per gross ton, delivered Cincinnati:	
Ala. fdy., sll. 1.75 to 2.25	\$18.82
Ala. fdy., sll. 2.25 to 2.75	14.32
Tenn. fdy., sll. 1.75 to 2.25	13.82
N'th'n No. 2 foundry	\$17.01 to 17.59
S'th'n Ohio silvery, 8 per cent	21.02

Freight rates, \$2.02 from Ironton and Jackson, Ohio; \$3.82 from Birmingham.

PHILADELPHIA

Per gross ton at Philadelphia:	
East. Pa. No. 2	\$15.59 to \$16.00
East. Pa. No. 2X	16.09 to 16.59
East. Pa. No. 1X	16.59 to 17.05
Basic (del'd east. Pa.)	16.60
Malleable	18.00 to 18.50
Stand. low phos. (f.o.b. east. Pa. furnace)	22.00 to 23.00
Cop. b'rg low phos. (f.o.b. furnace)	22.00 to 22.50
Va. No. 2 plain	22.04
Va. No. 2X	22.54

Prices, except as specified otherwise, are deliv'd Philadelphia. Freight rates 84c. to \$1.79 from eastern Pennsylvania furnaces; \$4.67 from Virginia furnaces

CLEVELAND

Per gross ton at Cleveland furnace:	
N'th'n No. 2 fdy. (local delivery)	\$15.50
S'th'n fdy., sll. 1.75 to 2.25	16.14
Malleable (local delivery)	15.50
Ohio silvery, 8 per cent	21.87
Stand. low phos., Valley	27.00

Prices are f.o.b. furnace except on Southern foundry and silvery iron. Freight rates: 55c. average local switching charge; \$3.12 from Jackson, Ohio \$6.14 from Birmingham.

BIRMINGHAM

Per gross ton, f.o.b. Birmingham dist. furnaces:	
No. 2 fdy., 1.75 to 2.25	\$11.00
No. 2 soft, 2.25 to 2.75	11.50
Basic	11.00

CANADA

Per gross ton:	
Delivered Toronto	
No. 1 fdy., sll. 2.25 to 2.75	\$22.60
No. 2 fdy., sll. 1.75 to 2.25	22.10
Malleable	22.60
Delivered Montreal	
No. 1 fdy., sll. 2.25 to 2.75	\$24.00
No. 2 fdy., sll. 1.75 to 2.25	23.50
Malleable	24.00
Basic	\$23.00 to 23.50

Other Ferroalloys

Ferrotungsten, per lb. wo. del., carloads	\$1.05
Ferrotungsten, less carloads	\$1.15 to 1.25
Ferrochromium, 4 to 6% carbon and up, 65 to 70% Cr., per lb. contained Cr.	
delivered, in carloads	10.00c.
Ferrochromium, 2% carbon	17.00c. to 17.50c.
Ferrochromium, 1% carbon	19.00c. to 20.00c.
Ferrochromium, 0.10% carbon	23.50c. to 25.00c.
Ferrochromium, 0.06% carbon	25.50c. to 27.00c.
Ferrovanadium, del., per lb. contained Va.	\$8.05 to \$3.30
Ferrocobaltitanium, 15 to 18%, per net ton, f.o.b. furnace, in carloads	160.00
Ferrophosphorus, electric or blast furnace material, in carloads, 18%, Rockdale, Tenn., base per gross ton	85.00
Fermolybdenum, per lb. Mo. del.	95c.
Calcium molybdate, per lb. Mo. del.	80c.
Ferrophosphorus, electric, 24%, f.o.b. Anniston, Ala., per gross ton	\$113.50
Silico-spiigel, per ton, f.o.b. furnace, car lots	42.50
Ton lots or less, per ton	47.50
Silico-manganese, gross ton, delivered:	
2.50% carbon grade	105.00
1% carbon grade	115.00
Spot prices	\$8 a ton higher

Fluorspar

Per Net Ton	
Domestic, washed gravel, 85-5, Kentucky and Illinois mines, freight allowed	
Pittsburgh basis	\$20.81
No. 2 lump, 85-5, Kentucky and Illinois mines, freight allowed, Pittsburgh basis	22.81
Foreign, 85% calcium fluoride, not over 5% silicon, c.i.f. Atlantic port, duty paid	
.....	\$17.00 to 17.40
Domestic, No. 1 ground bulk, 95 to 98% calcium fluoride, not over 2½% silicon, f.o.b. Illinois and Kentucky mines	32.00

Ores	
<i>Lake Superior Ores, Delivered Lower Lake Ports</i>	
<i>Per Gross Ton</i>	
Old range Bessemer, 51.50% iron	\$4.80
Old range non-Bessemer, 51.50% iron	4.65
Mesabi Bessemer, 51.50% iron	4.65
Mesabi non-Bessemer, 51.50% iron	4.50
High phosphorus, 51.50% iron	4.40
<i>Foreign Ore, c.i.f. Philadelphia or Baltimore</i>	
<i>Per Unit</i>	
Iron, low phos., copper free, 55 to 58% iron, dry Spanish or Algerian	8c. to 8.50c.
Iron, low phos., Swedish, aver. 68% iron	9.00c.
Iron, basic or foundry, Swedish, average 65% iron	8.00c.
Iron, basic and foundry, Russian, aver. 63% iron (nom.)	9.00c.
Manganese, Caucasian, washed 52%	24.00c.
Manganese, African, Indian, 50-52% 23c. to 24c.	
Manganese, Brazilian, 46 to 48% 21c. to 22c.	
<i>Per Gross Ton</i>	
Tungsten, Chinese wolframite	\$10.75 to \$11.00
Tungsten, domestic scheelite	10.00 to 10.50
Chrome, 45% Cr ₂ O ₃ , crude, c.i.f. Atlantic seaboard	\$18.00
Chrome, 48% Cr ₂ O ₃ , c.i.f. Atlantic seaboard	20.00
<i>Ferromanganese</i>	
<i>Per Gross Ton</i>	
Domestic, 80%, seaboard	\$72.00 to \$75.00
Foreign, 80%, Atlantic or Gulf port, duty paid	*72.00 to 75.00
<i>*Minimum price quoted for lots of 2000 tons or more.</i>	

Old Material Quotations

► PITTSBURGH ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$10.00 to \$10.50	
No. 2 heavy melting steel.	8.75 to 9.00	
No. 2 railroad wrought.	10.00 to 10.50	
Scrap rails.	10.00 to 10.50	
Rails 3 ft. and under.	12.00 to 12.50	
Sheet bar crops, ordinary.	10.00 to 10.50	
Compressed sheet steel.	9.75 to 10.25	
Hand bundled sheet steel.	8.75 to 9.25	
Hvy. steel axle turnings.	9.00 to 9.50	
Machine shop turnings.	6.75 to 7.25	
Short shov. steel turnings.	6.75 to 7.25	
Short mixed borings and turnings.	6.75 to 7.25	
Cast iron borings.	6.75 to 7.25	
Cast iron carwheels.	9.75 to 10.25	
Heavy breakable cast.	8.00 to 8.50	
No. 1 cast.	9.00 to 10.00	
Railr. knuckles and couplers.	10.50 to 11.00	
Rail. coil and leaf springs.	10.50 to 11.00	
Rolled steel wheels.	10.50 to 11.00	
Low phos. billet crops.	13.00 to 13.50	
Low phos. sheet bar crops.	12.50 to 13.00	
Low phos. plate scrap.	11.00 to 11.50	
Low phos. punchings.	11.00 to 11.50	
Steel car axles.	15.00 to 15.50	

► CLEVELAND ◄

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$7.25 to \$7.75	
No. 2 heavy melting steel.	6.50 to 7.00	
Compressed sheet steel.	7.00 to 7.25	
Light bundled sheet stampings.	6.00 to 6.50	
Drop forge flashings.	6.00 to 6.25	
Machine-shop turnings.	4.00 to 4.25	
Short shoveling turnings.	5.75 to 6.25	
No. 1 busheling.	6.50 to 6.75	
Steel axle turnings.	7.50 to 8.00	
Low phos. billet crops.	14.00 to 14.50	
Cast iron borings.	5.75 to 6.00	
Mixed borings and short turnings.	5.75 to 6.00	
No. 2 busheling.	5.75 to 6.00	
No. 1 cast.	9.00 to 9.50	
Railroad grate bars.	6.00 to 6.50	
Stove plate.	6.00 to 6.50	
Rails under 3 ft.	12.00 to 12.50	
Rails for rolling.	11.00 to 12.00	
Railroad malleable.	9.50 to 10.00	

► NEW YORK ◄

Dealers' buying prices per gross ton:		
No. 1 heavy melting steel.	\$4.25 to \$5.50	
No. 2 heavy melting steel.	4.00 to 4.00	
Heavy melting steel (yard).	2.75 to 3.00	
No. 1 hvy. breakable cast.	5.00 to 5.50	
Stove plate (steel works).	2.00 to 3.50	
Machine shop turnings.	1.00 to 1.50	
Short shoveling turnings.	1.00 to 1.50	
Cast borings.	1.00 to 1.50	
No. 1 blast furnace.	1.00 to 1.50	
Steel car axles.	10.00 to 10.50	
Iron car axles (nom.).	14.00 to 14.50	
Spec. iron and steel pipe.	3.00 to 3.50	
Forge fire.	3.25 to 3.25	
No. 1 railroad wrought.	5.00 to 5.25	
No. 1 yard wrought, long.	4.00 to 4.25	
Rails for rolling.	6.00 to 6.25	
No. 1 cast.	5.75 to 6.00	
No. 2 cast.	5.00 to 5.50	
Stove plate (foundry).	4.75 to 5.25	
Malleable cast (railroad).	6.00 to 6.50	
Cast borings (chemical).	7.00 to 7.50	

► CHICAGO ◄

Delivered Chicago district consumers:

Per Gross Ton

Per Gross Ton		
Heavy melting steel.	\$7.00 to \$7.25	
Shoveling steel.	7.00 to 7.25	
Frogs, switches and guards.	7.00 to 7.25	
Hydraulic comp. sheets.	5.75 to 6.25	
Drop forge flashings.	5.00 to 5.50	
No. 1 busheling.	5.00 to 5.50	
Rolled carwheels.	7.50 to 8.00	
Railroad tires.	9.00 to 9.50	
Railroad leaf springs.	8.50 to 9.00	
Axle turnings.	5.75 to 6.25	
Steel couplers and knuckles.	7.75 to 8.25	
Call springs.	9.50 to 10.00	
Axle turnings (elec. fur.).	6.00 to 6.50	
Low phos. punchings.	9.50 to 10.00	
Low phos. plates, 12 in. and under.	9.00 to 9.50	
Cast iron borings.	4.00 to 4.50	
Short shoveling turnings.	4.00 to 4.50	
Machine shop turnings.	3.50 to 4.00	
Berolling rails.	9.50 to 10.00	
Steel rails, less than 3 ft.	9.25 to 9.75	
Steel rails, less than 2 ft.	10.00 to 10.50	
Angle bars, steel.	8.25 to 8.75	
Cast iron carwheels.	7.00 to 7.50	
Railroad malleable.	6.50 to 7.00	
Agricultural malleable.	6.00 to 6.50	
*Relaying rails, 56 to 60 lb.	15.00 to 17.00	
*Relay. rails, 65 lb. and up	18.00 to 23.00	

Per Net Ton

Per Net Ton		
Iron angle and splice bars.	\$6.50 to \$7.00	
Iron arch bars, transoms.	6.50 to 7.00	
Iron car axles.	12.50 to 13.50	
Steel car axles.	9.00 to 9.50	
No. 1 railroad wrought.	5.50 to 6.00	
No. 2 railroad wrought.	6.25 to 6.50	
No. 1 busheling.	4.75 to 5.25	
No. 2 busheling.	2.50 to 3.00	
Locomotive tires, smooth.	8.00 to 9.00	
Pipes and flues.	3.25 to 3.75	
No. 1 machinery cast.	7.00 to 7.50	
Clean automobile cast.	6.75 to 7.25	
No. 1 railroad cast.	6.50 to 7.00	
No. 1 agricultural cast.	5.75 to 6.25	
Stove plate.	5.25 to 5.75	
Grate bars.	5.25 to 5.75	
Brake shoes.	6.75 to 7.25	

*Relaying rails, including angle bars to match, are quoted f.o.b. dealers' yards.

► PHILADELPHIA ◄

Per gross ton delivered consumers' yards:

Per gross ton delivered consumers' yards:		
No. 1 heavy melting steel.	\$7.00 to \$7.50	
No. 2 heavy melting steel.	5.50 to 6.00	
No. 1 railroad wrought.	8.50 to 9.00	
Bundled sheets.	6.00	
Hydraulic compressed, new.	6.00 to 6.50	
Hydraulic compressed, old.	5.00 to 5.50	
Machine shop turnings.	4.00 to 4.50	
Heavy axle turnings.	6.00 to 6.50	
Cast borings (nom.).	3.50	
Heavy breakable cast.	9.00	
Stove plate (steel works).	7.00	
No. 1 low phos. hvy.	10.00 to 11.00	
Couplers and knuckles.	8.00 to 8.50	
Rolled steel wheels.	8.00 to 8.50	
No. 1 blast furnace.	3.50	
Spec. iron and steel pipe.	8.00 to 8.50	
Shafting.	12.50 to 13.50	
Steel axles.	14.50 to 15.00	
No. 1 forge fire.	6.00	
Cast iron carwheels.	9.50 to 10.00	
No. 1 cast.	9.50 to 10.00	
Cast borings (chem.).	10.00 to 11.00	
Steel rails for rolling.	9.50 to 10.00	

► BIRMINGHAM ◄

Per gross ton delivered consumers' yards:		
Heavy melting steel.	\$7.50 to \$8.00	
Scrap steel rails.	7.50 to 8.00	
Short shoveling turnings.	3.50 to 4.00	
Stove plate.	6.00	
Steel axles.	12.00	
Iron axles.	12.00	
No. 1 locomotive tires.	9.25 to 9.75	
No. 1 railroad wrought.	6.00	
Rails for rolling.	9.00 to 9.50	
No. 1 cast.	8.50 to 9.00	
Tramcar wheels.	8.50	
Cast iron borings, chem.	8.50	

► ST. LOUIS ◄

Dealers' buying prices per gross ton:

Dealers' buying prices per gross ton:		
Selected heavy steel.	\$7.00 to \$7.50	
No. 1 heavy melting.	6.25 to 6.75	
No. 2 heavy melting.	5.75 to 6.25	
No. 1 locomotive tires.	6.00 to 6.50	
Misc. stand-sec. rails.	7.00 to 7.50	
Railroad springs.	8.00 to 8.50	
Bundled sheets.	4.25 to 4.75	
No. 2 railroad wrought.	6.25 to 6.75	
No. 1 busheling.	5.50 to 6.00	
Cast iron borings and shoveling turnings.	4.75 to 5.25	
Iron rails.	7.00 to 8.00	
Rails for rolling.	8.50 to 9.00	
Machine shop turnings.	3.00 to 3.50	
Heavy turnings.	5.00 to 5.50	
Steel car axles.	9.50 to 10.00	
Iron car axles.	12.50 to 13.00	
Wrot. iron bars and trans.	5.00 to 5.50	
No. 1 railroad wrought.	4.75 to 5.25	
Steel rails, less than 3 ft.	8.50 to 9.00	
Steel angle bars.	6.50 to 7.00	
Cast iron carwheels.	6.00 to 6.50	
No. 1 machinery cast.	8.00 to 8.50	
Railroad malleable.	5.00 to 5.50	
No. 1 railroad cast.	5.75 to 6.25	
Stove plate.	6.00 to 6.50	
Relay. rails, 60 lb. and under.	16.00 to 16.50	
Relay. rails, 70 lb. and over.	20.00 to 21.00	
Agricult. malleable.	5.00 to 5.50	

► DETROIT ◄

Dealers' buying prices per gross ton:		
Hvy. melting.	\$5.75 to \$6.25	
Borings and short turnings.	4.00 to 4.50	
Long turnings.	3.25 to 3.75	
No. 1 machinery cast.	8.50 to 9.00	
Automotive cast.	10.75 to 11.25	
Hydraul. comp. sheets.	5.75 to 6.25	
Stove plate.	4.50 to 5.00	
New No. 1 busheling.	4.75 to 5.25	
Old No. 2 busheling.	3.00 to 3.50	
Sheet clippings.	3.25 to 3.75	
Flashings.	4.75 to 5.25	

► CANADA ◄

Dealers' buying prices per gross ton:		
Toronto Montreal		
Heavy melting steel.	\$7.00	\$6.00
Rails, scrap.	7.00	6.00
No. 1 wrought.	6.00	8.00

Warehouse Prices for Iron and Steel Products

► CHICAGO ◄

	Base per Lb.
Plates and struc. shapes.....	3.00c.
Soft steel bars.....	2.75c.
Reinforcing bars, billet steel.....	1.75c.
Rail steel reinforcement.....	1.55c. to 1.65c.
Cold-fin. steel bars and shafting—	
Rounds and hexagons.....	3.10c.
Flats and squares.....	3.60c.
Bands, $\frac{1}{2}$ in. (In Nos. 10 and 12 gauges).....	2.95c.
Hoops (No. 14 gauge and lighter).....	3.50c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galv. sheets (No. 24).....	4.10c.
Hot-rolled sheets (No. 10).....	3.20c.
Spikes (3 in. and lighter).....	3.45c.
Track bolts.....	4.30c.
Rivets, structural.....	3.75c.
Rivets, boiler.....	3.75c.
Per Cent Off List	
Machine bolts.....	73
Carriage bolts.....	73
Coach and lag screws.....	73
Hot-pressed nuts, sq., tap. or blank.....	73
Hot-pressed nuts, hex., tap. or blank.....	73
No. 8 black ann'd wire, per 100 lb.....	\$3.45
Com. wire nails, base per keg.....	2.30
Cement c'td nails, base per keg.....	2.30

► CLEVELAND ◄

	Base per Lb.
Plates and struc. shapes.....	2.95c.
Soft steel bars.....	2.75c.
Reinfor. steel bars.....	1.75c. to 1.95c.
Cold-fin. rounds and hex.....	3.10c.
Cold-fin. flats and sq.....	3.60c.
Hoops and bands, No. 12 to $\frac{1}{2}$ in., inclusive.....	3.00c.
Hoops and bands, No. 13 and lighter.....	3.55c.
Cold-finished strip.....	5.55c.
Hot-rolled annealed sheets (No. 24).....	3.25c.
Galvanized sheets (No. 24).....	3.75c.
Hot-rolled sheets (No. 10).....	3.00c.
Black ann'd wire, per 100 lb.....	\$2.75
No. 9 galv. wire, per 100 lb.....	3.20
Com. wire nails, base per keg.....	2.35

*Net base, including boxing and cutting to length.

► CINCINNATI ◄

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
New billet reinforce. bars.....	3.00c.
Rail steel reinforce. bars.....	3.00c.
Hoops.....	3.90c.
Bands.....	3.20c.
Cold-fin. rounds and hex.....	3.50c.
Squares.....	4.00c.
Hot-rolled annealed sheets (No. 24).....	3.75c.
Galv. sheets (No. 24).....	4.25c.
Hot rolled sheets (No. 10).....	3.30c.
Structural rivets.....	4.20c.
Small rivets.....	60 per cent off list
No. 9 ann'd wire, per 100 lb.....	\$3.00
Com. wire nails, base per keg (10 to 49 kgs).....	2.65
Larger quantities.....	2.50
Cement c'td nails, base 100-lb. keg.....	2.95
Chain, per 100 lb.....	10.25
Net per 100 Ft.	
Seamless steel boiler tubes, 2-in. 4-in.	\$17.50
Lap-welded steel boiler tubes, 2-in. 4-in.	36.00
4-in.	16.50
4-in.	34.50

► BUFFALO ◄

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Soft steel bars.....	3.00c.
Reinforcing bars.....	2.65c.
Cold-fin. flats and sq.....	3.65c.
Rounds and hex.....	3.15c.
Cold-rolled strip steel.....	5.25c.
Hot-rolled annealed sheets (No. 24).....	3.70c.
Galv. sheets (No. 24).....	4.10c.
Bands.....	3.35c.
Hoops.....	3.90c.
Hot-rolled sheets (No. 10).....	3.50c.
Com. wire nails, base per keg.....	\$2.45
Black wire, base per 100 lb.....	3.20

► NEW YORK ◄

	Base per Lb.
Plates and struc. shapes.....	2.70c. to 3.10c.
Soft steel bars, small shapes.....	2.70c. to 3.10c.
Iron bars.....	3.24c.
Iron, Swed. charcoal.....	6.00c. to 6.50c.
Cold-fin. shafting and screw stock:	
Rounds and hexagons.....	3.40c.
Flats and squares.....	3.90c.
Cold-roll. strip, soft and quarter hard.....	4.95c.
Hoops.....	3.75c.
Bands.....	3.40c.
Hot-rolled sheets (No. 10).....	3.00c. to 3.25c.
Hot-rolled ann'd sheets (No. 24*).....	3.60c.
Galvanized sheets (No. 24*).....	4.00c.
Long terne sheets (No. 24).....	5.00c.
Standard tool steel.....	12.00c.
Wire, black annealed (No. 10).....	3.60c.
Wire, galv. annealed (No. 10).....	4.05c.
Tire steel, $\frac{1}{4}$ x $\frac{1}{2}$ in. and larger.....	3.40c.
Smooth finish, 1 to 2 $\frac{1}{2}$ x $\frac{1}{4}$ in. and larger.....	3.75c.
Open-hearth spring steel, bases, Per Cent Off List	
4.50c. to 7.00c.	
Common wire nails, base, per keg.....	\$2.60
Machine bolts, cut thread: Off List	
$\frac{3}{4}$ x 6 in. and smaller.....	65 to 65 and 10
1 x 30 in. and smaller.....	65 to 65 and 10
Carriage bolts, cut thread:	
$\frac{1}{4}$ x 6 in. and smaller.....	65 to 65 and 10
$\frac{3}{4}$ x 20 in. and smaller.....	65 to 65 and 10
Boiler Tubes: Per 100 Ft.	
Lap welded, 2-in.....	\$19.00
Seamless steel, 2-in.....	20.25
Charcoal iron, 2-in.....	26.25
Charcoal iron, 4-in.....	67.00
*No. 28 and lighter, 36 in. wide, 20c. higher per 100 lb.	

► ST. LOUIS ◄

	Base per Lb.
Plates and struc. shapes.....	3.25c.
Bars, soft steel or iron.....	3.00c.
Cold-fin. rounds, shafting, screw stock.....	3.35c.
Hot-rolled annealed sheets (No. 24).....	3.80c.
Galv. sheets (No. 24).....	4.35c.
Hot-rolled sheets (No. 10).....	3.45c.
Black corrug. sheets (No. 24).....	3.85c.
Galv. corrug. sheets.....	4.40c.
Structural rivets.....	4.00c.
Boller rivets.....	4.00c.
Per Cent Off List	
Tank rivets, $\frac{1}{2}$ -in. and smaller, 100 lb. or more.....	65
Less than 100 lb.....	60
Machine bolts.....	73
Carriage bolts.....	73
Lag screws.....	73
Hot-pressed nuts, sq., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63
Hot-pressed nuts, hex., blank or tapped, 200 lb. or more.....	73
Less than 200 lb.....	63

► PACIFIC COAST ◄

	Base per Lb.
San Fran. Los Angeles Seattle	
Plates and struc. shapes, $\frac{1}{4}$ -in. and heavier.....	3.15c. 3.15c. 2.75c.
Soft steel bars.....	3.15c. 3.15c. 2.75c.
Reinforcing bars.....	2.80c. 2.80c. 3.00c.
Hot-rolled annealed sheets (No. 24).....	3.95c. 4.05c. 4.25c.
Hot-rolled sheets (No. 10).....	3.50c. 3.50c. 3.75c.
Galv. sheets (No. 24).....	4.55c. 4.35c. 4.75c.
Struct. rivets, $\frac{1}{2}$ in. and larger, less than 1000 lb....	5.00c. 5.00c. 4.00c.
Cold-finished steel bars and shaftings:	
Rounds.....	5.25c. 5.15c. 4.25c.
Squares.....	6.25c. 6.15c. 5.50c.
Hexagons.....	6.25c. 5.15c. 5.50c.
Flats.....	6.75c. 6.15c. 6.50c.
Common wire nails, base per keg in less carloads.....	\$2.75 \$2.75 \$2.85
Plates, shapes, bars, bands and hot-rolled sheets, No. 16 gauge and heavier, subject to group differentials.	
Cold-finished steel bars and shafting, subject to warehouse differentials for quantity.	
All prices f.o.b. warehouse.	

► PITTSBURGH ◄

	*Base per Lb.
Plates.....	2.85c.
Structural shapes.....	2.85c.
Soft steel bars and small shapes.....	2.60c.
Reinforcing steel bars.....	2.60c.
Cold-finished and screw stock:	
Rounds and hexagons.....	3.10c.
Squares and flats.....	3.60c.
Bands.....	2.95c.
Hoops.....	3.60c.
Hot-rolled annealed sheets (No. 24), 25 or more bundles.....	3.15c.
Galv. sheets (No. 24), 25 or more bundles.....	3.60c.
Hot-rolled sheets (No. 10).....	3.10c.
Galv. corrug. sheets (No. 28), per square (less than 3750 lb.).....	\$3.74
Spikes, large.....	2.50c.
Small.....	2.75c. to 2.90c.
Boat.....	3.00c.
Track bolts, all sizes, per 100 count, 70 and 10 per cent off list	
Machine bolts, 100 count, 70 and 10 per cent off list	
Carriage bolts, 100 count, 70 and 10 per cent off list	
Nuts, all styles, 100 count, 73 and 10 per cent off list	
Large rivets, base per 100 lb.....	\$3.00
Wire, black, soft ann'd, base per 100 lb.....	2.75
Wire, galv. soft, base per 100 lb.....	3.20
Common wire nails, per keg.....	2.35
Cement coated nails, per keg.....	2.35

*On plates, structural, bars, reinforcing bars, bands, hoops and blue annealed sheets, base applied to orders of 400 to 999 lb.

► PHILADELPHIA ◄

	Base per Lb.
Plates, $\frac{1}{4}$ -in. and heavier.....	2.45c.
Structural shapes.....	2.45c.
Soft steel bars, small shapes, iron bars (except bands).....	2.45c.
Reinfor. steel bars, sq., twisted and deform.....	2.30c.
Cold-fin. steel, rounds and hex.....	3.30c.
Cold-fin. steel, sq. and flats.....	3.80c.
Steel hoops.....	3.00c.
Steel bands, No. 12 to $\frac{1}{2}$ -in., incl. 100 ft. 14 gauge and heavier.....	2.75c.
Spring steel.....	5.00c.
Hot-rolled annealed sheets (No. 24).....	3.55c.
Galvanized sheets (No. 24).....	3.50c.
Hot-rolled and annealed sheets (No. 10).....	3.05c.
Diam. pat. floor plates, $\frac{1}{4}$ in.	5.00c.
Swedish iron bars.....	6.60c.

These prices are subject to quantity differentials except on reinforcing and Swedish iron bars.

► BOSTON ◄

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Copper Situation Slowly Improving; Lead Buying Gains; Tin Weak

NEW YORK, April 5.—For the fourth week the price of electrolytic copper has been fairly well maintained at 6c. a lb., delivered Connecticut Valley. The even tenor of the market, however, is still attributable to adjustments slowly progressing within the industry, rather than to improvement in consumption of copper. Notwithstanding the sluggish consumer demand that has prevailed in the past few months, leading interests here believe that were copper statistics available at this time they would indicate a marked decrease in producers' stocks. Current business is limited to small lots for shipment through June, while releases against old contracts are in greater evidence.

The price of Copper Exporters, Inc., unchanged at 6.25c. a lb., c.i.f. usual European ports. Foreign demand has fallen off sharply, and export sales thus far in April have averaged only 100 tons a day. Total export bookings in March amounted

to about 20,000 tons, compared with 29,000 tons in February. Lake copper is quiet and nominally quotable at 6.12½c., delivered.

Copper Averages

The average price of Lake copper, based on daily quotations in THE IRON AGE, is 6.17c. a lb., delivered New York, for March. The average price of electrolytic copper is 5.76c., refinery, or 6.01c., delivered in the Connecticut Valley.

Lead

Buying of lead in the Middle West in the past week approached sizable proportions. April bookings by the leading producer in that section are already greater than for the entire preceding month. Activity in the East, however, has been quiet, with orders generally restricted to small lots for early shipment. About three-fourths of consumer requirements are covered for April, while some users have already bought against their

early May needs. Prices are being held firmly at 3c., New York, and 2.90c., St. Louis.

Tin

Following a break in the price last week to below 20c., fairly good sales were made, mostly for nearby delivery to consumers. With the price apparently established at 19.50c. to 19.60c., interest in buying has subsided, pending further trend in the market. Today's market is 19.60c. Fluctuations in sterling and heavy liquidation reported for Continental account have sent the London market down sharply. The London quotation today is £109 a ton for spot standard, £111 for future standard and £112 10s. for spot Straits. The Singapore market today is £114 10s. A shipment of tin from Liverpool accounted largely for a decrease of 253 tons last week in United Kingdom warehouse stocks, which now stand at 33,217 tons.

Zinc

Based upon expectations of shrinkage in April production of zinc, price shading has disappeared and quotations are well established at 2.80c., East St. Louis, and 3.17c., New York. Current interest, however, is quiet and sales are light. Total bookings in the past week were about 2000 tons.

Antimony

Prompt metal is being offered at 6.05c., duty paid, New York, and cable offerings are being renewed at 3.75c., c.i.f. New York, for delivery through May. No transactions, however, were in evidence in the past week.

The Week's Prices. Cents Per Pound for Early Delivery

	Mar. 30	Mar. 31	Apr. 1	Apr. 2	Apr. 4	Apr. 5
Lake copper, New York.....	6.12½	6.12½	6.12½	6.12½	6.12½	6.12½
Electrolytic copper, N. Y.*.....	5.75	5.75	5.75	5.75	5.75	5.75
Straits tin, spot, N. Y.....	21.10	20.70	19.95	19.50	19.60	19.60
Zinc, East St. Louis.....	2.80	2.80	2.80	2.80	2.80	2.80
Zinc, New York.....	3.17	3.17	3.17	3.17	3.17	3.17
Lead, St. Louis.....	2.90	2.90	2.90	2.90	2.90	2.90
Lead, New York.....	3.00	3.00	3.00	3.00	3.00	3.00

*Refinery quotation; price ½c. higher delivered in the Connecticut Valley.
Aluminum, 98 to 99 per cent pure, 22.90c. a lb., delivered.
Nickel, electrolytic cathode, 35c. a lb., delivered; shot and ingot, 36c. a lb., delivered.
Antimony, 6.05c. a lb., New York.
Brass ingots, 85-5-5, 6.25c. a lb., New York and Philadelphia.

From New York Warehouse

Delivered Prices, Base per Lb.

Tin, Straits pig.....	23.00c. to 24.00c.
Tin, bar.....	25.00c. to 27.00c.
Copper, Lake.....	8.00c. to 9.00c.
Copper, electrolytic.....	7.75c. to 8.75c.
Copper, casting.....	7.50c. to 8.50c.
Copper sheets, hot-rolled.....	15.37½c.
High brass sheets.....	12.50c.
Seamless brass tubes.....	15.75c.
Seamless copper tubes.....	14.87½c.
Brass rods.....	10.25c.
Brazed brass tubes.....	21.62½c.
Zinc, slab.....	4.00c. to 4.50c.
Zinc sheets (No. 9), tanks.....	9.25c. to 9.50c.
Lead, American pig.....	4.00c. to 4.50c.
Lead, bar.....	5.75c. to 6.75c.
Lead sheets.....	7.50c.
Antimony, Asiatic.....	9.00c. to 10.00c.
Alum, virgin, 99 per cent plus.....	23.20c.
Alum, No. 1 for remelt-ing, 98 to 99 per cent.....	17.00c. to 18.00c.
Brass, ½ and ¾.....	14.75c. to 15.75c.

*These prices are also for delivery from Chicago and Cleveland warehouses.

Metals from Cleveland Warehouse

Delivered Prices per Lb.

Tin, Straits pig.....	24.00c.
Tin, bar.....	26.00c.

Copper, Lake.....

Copper, electrolytic.....

Copper, casting.....

Zinc, s'ab.....

Lead, American pig.....

Lead, bar.....

Antimony, Asiatic.....

Hvy. machine composition.....

No. 1 yel. brass turnings.....

No. 1 red brass or compos. turnings.....

Copper, light and bottoms.....

Brass, heavy.....

Brass, light.....

Hvy. machine composition.....

No. 1 yel. brass turnings.....

No. 1 red brass or compos. turnings.....

Copper, hvy. crucible.....

Copper, hvy. and wire.....

Copper, light and bottoms.....

Brass, heavy.....

Brass, light.....

Hvy. machine composition.....

No. 1 yel. brass turnings.....

No. 1 red brass or compos. turnings.....

Copper, hvy. crucible.....

Copper, hvy. and wire.....

Copper, light and bottoms.....

Brass, heavy.....

Brass, light.....

Hvy. machine composition.....

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No. 1 red brass or compos. turnings.....

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Copper, hvy. and wire.....

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No. 1 red brass or compos. turnings.....

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Copper, hvy. and wire.....

Copper, light and bottoms.....

Brass, heavy.....

Brass, light.....

Hvy. machine composition.....

No. 1 yel. brass turnings.....

No. 1 red brass or compos. turnings.....

Copper, hvy. crucible.....

Copper, hvy. and wire.....

Copper, light and bottoms.....

Brass, heavy.....

Brass, light.....

Hvy. machine composition.....

No. 1 yel. brass turnings.....

PLANT EXPANSION AND EQUIPMENT BUYING

Automotive Activity Raises Hopes of Machine Tool Trade

A MORE hopeful feeling has developed in the machine tool industry, largely because of expectations that competitive conditions in the automobile industry will force parts makers to install new equipment to reduce manufacturing costs. Quite a little inquiry has come out, particularly in the Detroit and Cleveland districts, for automatic screw machines for work on new products which

various companies are contemplating bringing out.

Automobile parts makers are getting releases from the Ford Motor Co. In the Chicago district some inquiries for tools are directly traceable to these releases.

At Cincinnati a little more interest in heavy-duty lathes is noted. Business generally is very dull in that tool manufacturing center, and some

Sales Have Not Improved But Inquiries Are Coming More Freely from Parts Makers

plants have further curtailed working forces. A number of plants are operating alternate weeks.

Sales in March showed a slight gain for some companies, but there was no broad improvement over the February results, which were very poor. Prospects for April appear to indicate that some improvement may take place, but the machine tool industry is not expecting much change.

NEW YORK ▶

Westchester Airport Association, John S. Reaves, Rye, N. Y., secretary, is planning construction of County airport near White Plains, with hangars, repair and reconditioning shop and other field units. Major Gen. John F. O'Ryan, head of Colonial Air Transport, Inc., 122 East Forty-second Street, New York, is president of association.

Mexican Petroleum Corp., 122 East Forty-second Street, New York, is considering expansion at Carteret, N. J., plant, including building units and equipment. James Patterson is terminal manager at Carteret plant.

Perfection Appliances, Inc., New York, has been organized by Benjamin L. Bossie, 2080 Daly Avenue, Bronx, and associates, capital \$50,000, to manufacture laundry machinery and parts.

Signal Supply Officer, Army Base, Brooklyn, asks bids until April 12 for 1200 pliers (Circular 118); until April 11 for 8000 brackets, 1000 binding posts, 1000 terminal blocks (Circular 119); until April 15 for 161,080 ft. wire (Circular 118), 5000 terminals, etc. (Circular 114); until April 18 for 150 armatures for dynamotors (Circular 116), 64,000 ft. conduit (Circular 117), quantity of time interval equipment (Circular 111); until April 19 for 100,000 hammer drive galvanized anchors (Circular 120); until April 25 for 75 transformers, 800 resistors, 125 ammeters and other equipment (Circular 121).

Roto Metal Specialty Co., Inc., Long Island City, has leased floor in building at 35 Wilbur Avenue for manufacture of metal products.

Department of Hospitals, Municipal Building, New York, proposes call for bids in May for addition to steam power plant at Bellevue Hospital, including soot collector station. Fund of \$200,000 available for work. C. B. Meyers, 31 Union Square, architect.

Foremost Refrigeration, Inc., Brooklyn, has been organized by Julius Moss, 2138 Seventy-third Street, and Victor J. Moss, 1970 East Eighteenth Street, to manufacture steel parts, castings, etc., for refrigerating service.

Automatic Coinwrapping Machine Corp., 80 Greenwich Street, New York, has leased floor in building at 37-41 West Eighteenth Street for plant.

Radio Products Corp., 548 South Eleventh Street, Newark, N. J., arranging reorganization and expansion for production of new type midget radio receiving set and plans output of about 1,000,000 units during next year. Local plant will be given over largely to assembling, with working force of about 1000 persons in next six weeks. Other plants of company will be used for parts manufacture, electric clocks and cabinets, giving employment to similar number of workers.

Durable Luminous Tubing Co., Inc., Newark,

N. J., care of Philip S. Liberman, 786 Broad Street, has been organized by Peter Mancino, Newark, and associates to manufacture lighting devices, luminous tubing, etc.

Worthington Pump & Machinery Corp., Harrison, N. J., secured contract totaling \$115,000 from Water Department, Cincinnati, for three large pumping units and plans increased production schedule, recalling number of employees.

McDermott & Bindu, 582 Bergenline Avenue, Union City, N. J., architects, have plans for one-story industrial shop, 20 x 91 ft., at North Bergen, N. J., owner's name temporarily withheld.

PHILADELPHIA ▶

Nicholson File Co., Acorn Street, Providence, R. I., manufacturer of files, rasps, etc., is arranging for discontinuance of branch plant at Paterson, N. J., and will consolidate with plant at Philadelphia. Removal of equipment will be carried out this month.

Commanding Officer, Frankford Arsenal, Philadelphia, asks bids until April 11 for one gasoline-electric generating set (Circular 413); until April 14 for one electric-driven ripping and jointing saw and one boxboard matcher (Circular 414).

Champion Lighting Co., Philadelphia, has been organized by Samuel Kofsky, 470 Flushing Avenue, Brooklyn, and Henry M. Kofsky, 2414 North Fifty-third Street, Philadelphia, to take over and expand company of same name at 43 North Seventh Street, manufacturer of electric lighting fixtures and other metal products.

Radio Condenser Co., Camden, N. J., manufacturer of radio condensers and equipment, plans establishment of branch plant at Toronto, to take care of Canadian trade.

Knitting Machine Corp. of America, Inc., Camden, N. J., has been organized by George P. Dowling, Audubon, N. J., and John T. Parr, Collingswood, N. J., capital \$125,000, to manufacture knitting machinery and parts.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 12 for quantity of steel bolts and nuts (Schedule 775), quantity of brass bolts and nuts (Schedule 7756); until April 19 for 18 metal propeller blades (Schedule 7784) for Philadelphia yard.

Lighting Bureau, City Hall Annex, Philadelphia, Frank H. Caven, director, asks bids until April 20 for lamp posts for incandescent mantle lamps.

Bell-Mattern Foundry, Inc., Pottstown, Pa., has been organized by Harry C. Bell, 914 North Fourth Street, and Henry F. Mattern, 556 South Nineteenth Street, both Reading,

Pa., to operate foundry for production of iron, steel, brass, aluminum and other metal products.

NEW ENGLAND ▶

Boston Elevated Railway, 31 St. James Avenue, Boston, plans purchase of Massachusetts Street Railway Co., operating at Revere, Everett, Chelsea, Malden and Boston, for \$2,800,000, and in accordance with Legislative approval, now being arranged, will expend \$500,000 for extensions and improvements, majority of amount to be used for new electric power plant.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 12, for one motor-driven centrifugal pump (Schedule 7697), for Newport, R. I. Navy Yard.

Gas-Weld Equipment Co., Boston, has been organized by John J. Lee, Wakefield, Mass., and associates to manufacture welding apparatus.

Central Maine Power Co., Augusta, Me., through subsidiary, Central Securities Corp., acquired Livermore Falls Power & Light Co., Livermore Falls; Turner Light & Power Co., Turner, and Dennistown Power Co., Dennistown. Extensions and improvements are planned, including transmission lines.

Standard Oil Co. of New York, 31 St. James Avenue, Boston, let general contract to Bay State Dredging & Contracting Co., 62 Condor Street, East Boston, for bulk oil storage and distributing plant at Quincy, Mass., including pumping plant, motor truck service, repair and garage building, and other mechanical units. Cost over \$600,000 with equipment.

Department of Hospitals, Commonwealth of Massachusetts, Boston, has plans for new pumping plant and steel standpipe at State Hospital. Work will be part of \$200,000 program for water supply at institution. J. J. Van Valkenburgh, Irving Square, Framingham, Mass., engineer.

BUFFALO ▶

Board of Education, City Hall, Buffalo, asks bids until April 12 for radio equipment, including transmitter, etc., for broadcasting station WSVS at Seneca Vocational High School. James Storer, secretary.

Remington-Rand, Inc., Syracuse, N. Y., has increased working force to about 1100 at local noiseless portable typewriter plant, running on full day shift, with partial night force.

Common Council, Lockport, N. Y., authorized fund for a municipal automobile service and repair shop, with garage and tool house for city-owned equipment.

Lakeside Bronze, Inc., Buffalo, has been organized by Joseph F. Buhrlie, 7 Hartman

ALL IN ONE

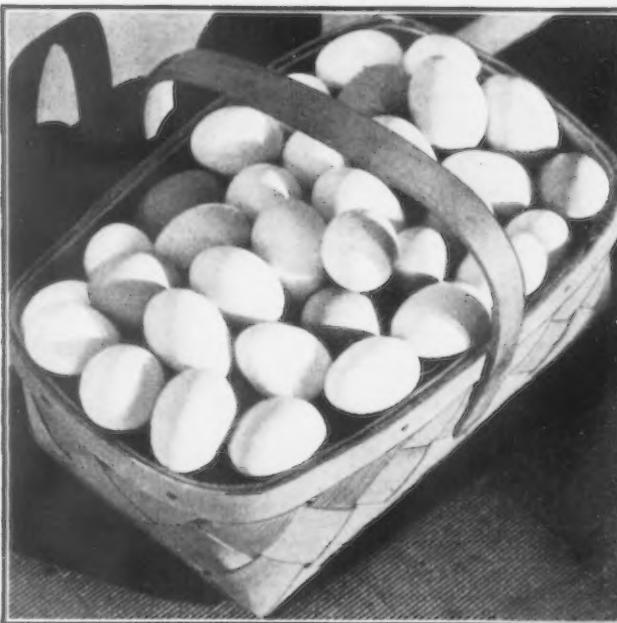
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STEEL WIRE

OF ANY ANALYSIS

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IN some instances it does pay to "Put All Your Eggs In One Basket." One source of supply meets every steel wire requirement. We place more than 100 years of wire making experience at your service.

Our facilities have been expanded in order to meet the growing demands of the trade for steel wire of all kinds. This enables us to place at your service the most reliable source of supply for steel wire of any analysis—and in any form that is commercially possible to produce.



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WIRE FOR MANUFACTURING
COLD ROLLED STRIP STEEL
COLD FINISHED STEEL BARS
WIRE PRODUCTS

1831



1932

AMERICAN STEEL & WIRE COMPANY

208 South LaSalle Street, Chicago

SUBSIDIARY OF UNITED STATES STEEL CORPORATION

And All Principal Cities

Pacific Coast Distributors: Columbia Steel Company, Russ Building, San Francisco

Export Distributors: United States Steel Products Company, New York

Place, and Leo G. Smith, 115 Humber Avenue, to operate foundry for production of bronze, brass and other castings.

American Crane Co., Inc., Friendship, N. Y., has been placed in temporary receivership. W. A. Barber, a director of company, has been appointed receiver.

◀ SOUTH ATLANTIC ▶

Corps Area Engineer, Third Corps District, 311 St. Paul Place, Baltimore, asks bids until April 15 for one rigid steel tower and shelter at Fort Monroe, Va.

Susquehanna Transmission Co., operated by Pennsylvania Water & Power Co., Lexington Building, Baltimore, has applied for permission to build steel tower transmission line through Cecil County from point on Pennsylvania-Maryland State line. System will be connected with generating station of Safe Harbor Water Power Corp., Safe Harbor, Pa., an affiliated interest.

Bureau of Prisons, Department of Justice, Washington, asks bids until April 12 for boiler feed pumps, steam heating vacuum pumps, hot water circulating pumps, condensation pumps and receiver, hot water storage tank, feed water heater, boiler feed water regulators and other equipment (Schedule 574).

Moss Chemical Co., Masonic Building, Dalton, Ga., recently reorganized, plans installation of equipment at tale properties at Chatworth, Ga., including pulverizing machinery, bagging equipment, pumping machinery, motors and accessory equipment. J. O. McCutcheon is chief engineer.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 19 for following motor-driven machine tools for Brooklyn, Philadelphia, Mare Island and Puget Sound Navy Yards: Three engine lathes and spare parts (Schedule 7765), four milling machines and spare parts (Schedule 7765), four sensitive drills and 24 brushes (Schedule 7760), four 28-in. drills (Schedule 7764), four crank shapers (Schedule 7763), four power back saws and spare brushes (Schedule 7761), four grinders and 24 brushes (Schedule 7762). One gasoline engine-driven tractor (Schedule 7755), 229,000 lb. corrugated steel (Schedule 7783) for New York or San Francisco yard.

Moller Motor Car Co., Haverstown, Md., is increasing production and has recalled about 100 men to plant. Company recently secured order for 200 taxicabs for Paramount Cab Co., New York.

◀ CLEVELAND ▶

Sabin Machine Co., 6536 Carnegie Avenue, Cleveland, manufacturer of special tools and machinery, purchased property on Cedar Avenue and plans one-story addition. Cost over \$45,000 with equipment. H. M. Morse Co., 736 Prospect Avenue, architect and engineer.

City Council, Wellsville, Ohio, plans electrification of pumping plant used for municipal water system. D. D. Duty, Service-Safety Director, in charge.

Frank D. Henderson, Adjutant General of Ohio, Columbus, asks bids until April 18 for an addition to Ohio State hangar, Cleveland, including improvements in present unit. Fred W. Elliott, Columbus, is State architect.

New York Central Railroad Co., Cleveland, has reopened repair shops at Ashtabula, Ohio, and expects to continue operations through summer. Local steel car shops resumed production about month ago.

Ohio Edison Co., Akron, Ohio, approved plans for two new power substations at Fairlawn, near Akron, and at Medina, Ohio. Cost about \$100,000 with equipment. Allied Engineers, Inc., 162 Carroll Street, Akron, engineers.

Electric Furnace Co., Salem, Ohio, has purchased Process Engineering & Equipment Corp., Attleboro, Mass.

◀ CINCINNATI ▶

Contracting Officer, Material Division, Wright Field, Dayton, Ohio, asks bids until April 20 for quantity of floodlight lamp assemblies (Circular 343); until April 25 for quantity of single and double-faced racks (Circular 336).

A. V. Carroll Machine Tool Co., Inc., Norwood, Cincinnati, has been organized by L. E. Tully, William C. Kelly and others to take over and expand company of same name with plant at Highland and Orchard Streets.

Mid-South Airways, Inc., Municipal Airport, Memphis, Tenn., plans one-story hanger, 60 x 230 ft., with repair and reconditioning facilities. Cost about \$40,000 with equipment. A. F. Hansen, Shrine Building, is architect.

Angle Blackford Co., Nashville Trust Building, Nashville, Tenn., plans purchase of small motor-driven air compressor for service for stone clipping hammers, etc.

Buffalo-Springfield Roller Co., Kenton Avenue, Springfield, Ohio, manufacturer of road rollers, road scarifiers, etc., has arranged with Waterous, Ltd., Brantford, Ont., for manufacture of products at that plant for Canadian trade.

Gulf Refining Co., Frick Annex, Pittsburgh, has acquired site on Tennessee River, at Paducah, Ky., and contemplates bulk oil storage and distributing plant, with terminal facilities.

◀ GULF STATES ▶

T. M. Francis, Brown-Marx Building, Birmingham, engineer, plans purchase of power equipment, including 200-kw. uniflow or Diesel type engine-generator unit, 350-hp. boiler and accessories.

City Council, Tuscaloosa, Ala., is considering installation of pumping machinery and auxiliary equipment for extensions and improvements in municipal waterworks. Bonds approved for \$75,000. W. H. Nichol is city engineer.

C. L. Briggs and John L. Barry, Lafayette, La., are at head of project to build plant for manufacture of reinforced-concrete pipe. Cost about \$25,000 with casting and other machinery. W. B. Landes, Beaumont, Tex., is interested.

City Council, Miami, Fla., has authorized purchase of over 1700 acres near Opa Locka, for expansion in airport facilities, with later construction of hangars, repair shops and other field units. About 650 acres of tract will be leased by United States Navy for air station for development of lighter-than-air craft.

Continental Can Co., 1 Pershing Square, New York, has plans for new plant on property recently acquired at Houston, Tex., and will soon take bids on general contract. Cost over \$100,000 with equipment. Favret & Livaudais, Nolan Building, New Orleans, La., architects and engineers.

Board of City Commissioners, Charleston, Miss., has authorized erection of a municipal electric light and power plant. Estimates of cost being made. It is also proposed to provide municipal waterworks, with pumping equipment, etc.

Shudde Mfg. Co., Houston, Tex., has been organized by J. A. B. W., and A. J. Shudde, 4510 Woodside Street, to manufacture metal products.

S. A. Guiberson, Jr., president of Guiberson Corp., Forest Avenue, Dallas, Tex., manufacturer of oil well machinery, oil drills, etc., and associates have organized Guiberson Oil & Investment Co., Dallas, capital \$2,500,000, to take over and operate oil properties and refineries.

◀ DETROIT ▶

Cadillac Can Co., 711 Carr Street, Cincinnati, manufacturer of special metal stampings, tin containers, etc., has acquired property at Mount Clemens, Mich., and will remove to that location. Increased capacity will be carried out.

A. C. Spark Plug Co., Flint, Mich., has leased property at St. Catharines, Ont., and will establish new branch plant for Canadian trade.

Reynolds Spring Co., Jackson, Mich., manufacturer of automobile springs, etc., is removing branch plant at 5171 Bellevue Avenue, Detroit, to main factory at Jackson, where production will be concentrated.

Fairview Screw Products Co., 1155 East Jefferson Street, Detroit, has been organized by Tracy P. Miller and William V. Rogers, Detroit, to manufacture screw machine products.

Barton Foundry & Specialty Co., 3627 Superior Street, Detroit, has been organized by H. J. Barton and John Kotcher, Detroit, to manufacture iron, steel, brass, bronze and other metal castings.

Consumers Power Co., Jackson, Mich., is planning installation of natural gas distribu-

ting systems in Broomfield and Deerfield Townships, Isabella County. Company will connect with main natural gas pipe line from Broomfield gas field.

◀ PITTSBURGH ▶

Washington Tin Plate Co., Woodland Avenue, Washington, Pa., let general contract to Washington Engineering & Construction Co., Oakland Avenue, for one-story machine shop, 50 x 100 ft. Cost about \$35,000 with equipment.

Board of County Commissioners, County Office Building, Pittsburgh, asks bids until April 12 for wrought iron and wire mesh fence for County airport.

Web-Lite Co., 3815 Forward Avenue, Pittsburgh, has been organized by Walter K. Elder, 1016 South Avenue, Wilkinsburg, Pa., and John R. Martin, 1016 North Highland Avenue, Pittsburgh, to manufacture automatic mechanical devices and equipment.

Hammermill Paper Co., East Lake Road, Erie, Pa., has plans for one-story addition, 130 x 260 ft. Cost about \$100,000 with equipment.

Spang & Co., Inc., Butler, Pa., manufacturer of oil well tools and equipment, has advanced production and is now on heavier basis than at any time for past 24 months, giving employment to about 100 men on full time operations in all departments.

◀ CHICAGO ▶

Chicago, Rock Island & Pacific Railroad Co., Chicago, is increasing operations at repair shops at Shawnee, Okla., adding about 150 men to working force. This makes about 600 men engaged at plant on five-day week schedule.

City Council, Whitehall, Ill., engaged Russell & Axon, Roosevelt Building, St. Louis, consulting engineers, to prepare plans for municipal electric light and power plant. Cost over \$70,000 with equipment.

National Wheel & Parts Mfg. Co., 1810 South Michigan Avenue, Chicago, has been organized by Joel A. Anderson and associates to take over and expand company of same name, manufacturer of automobile wheels, parts, etc.

Christian Brothers, Littleton, Colo., care of Rev. F. Gregory Smith, St. Mary's Church, are planning new boys' school on Shirley Farm, near Littleton, with facilities for industrial training for 200 boys.

Common Council, Sumner, Iowa, plans call for bids in May for municipal electric light and power plant. Bond issue of \$95,000 has been approved. H. L. Cory, 3905 North Seventeenth Street, Omaha, Neb., consulting engineer.

Superintendent, Flandreau Indian School, Flandreau, S. D., asks bids until April 12 for seven distribution transformers.

Pullman Car & Mfg. Co., Chicago, has increased working force by about 600 men at local shops during past 60 days, with maximum capacity developed in air-conditioning equipment installation division.

Common Council, Morris, Minn., is arranging special election to approve bond issue for about \$150,000 for installation of municipal electric light and power plant.

Signal Corps Procurement District, Chicago, asks bids until April 26 for switchboards and repair parts, including socket and jack trips, generators, condensers, keys, relays, coils, etc. (Circular 47).

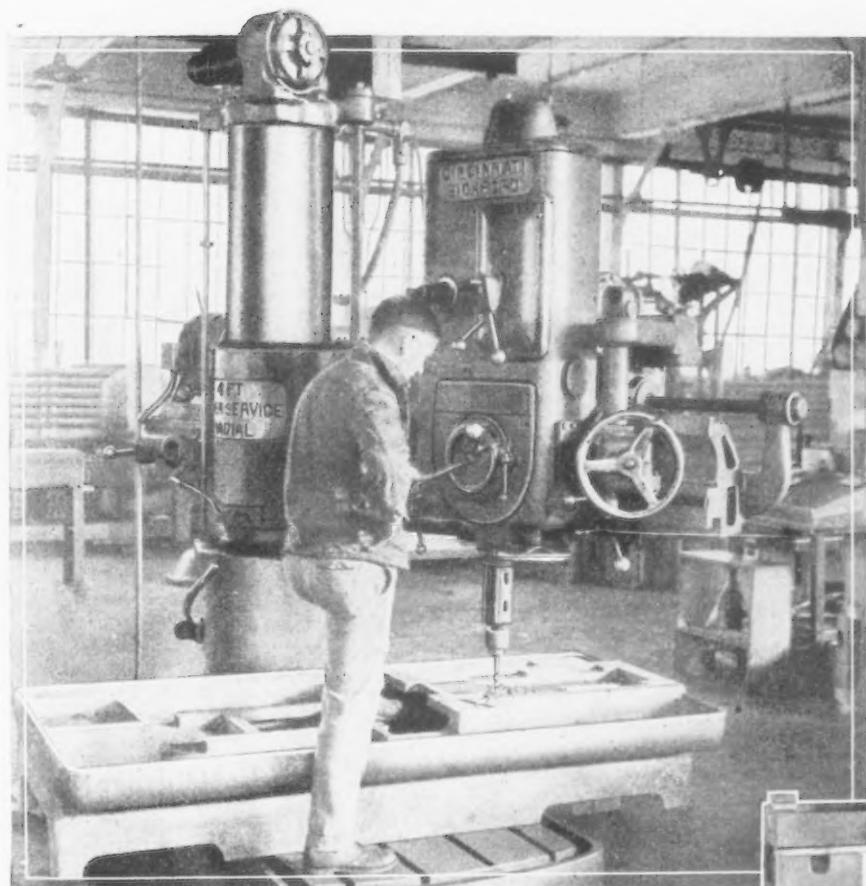
◀ MILWAUKEE ▶

Mid-West Can Co., Milwaukee, has been incorporated with \$25,000 capital stock to manufacture tin containers and other metal products. Principals are Abraham Rickover and E. R. Jewasinski, 1241 Dewey Avenue, Wauwatosa, and M. L. Blumenthal, 910 East Wisconsin Avenue.

Hasco Valve & Machine Co., Milwaukee, has been organized by H. A. Schauer to take over manufacturing department of B. Hoffman Mfg. Co., 1819 West St. Paul Avenue, Milwaukee, plumbing and heating supplies. New company will specialize in manufacture of valves and fittings for power plants, paper mills and chemical industry, and special line of chrome nickel steel valves and fittings for dairy industry.

Hoffert Machinery Co., Inc., Racine, Wis., has been incorporated to manufacture cutting tools. Space has been leased at Chatham and Hamilton Streets. Principals are Roy J. and Herbert C. Hoffert.

10 Hours Work in 7 Hours



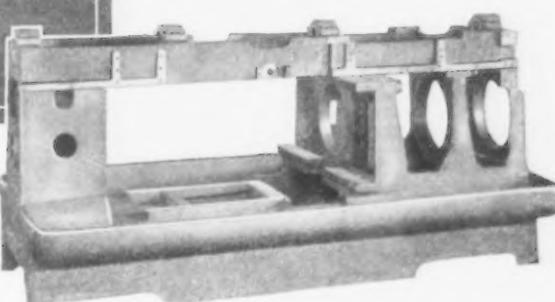
Another victory for the Super-Service Radial is credited to its centralized control, which saves steps and saves time.

The machine frame for the Cone Automatic contains 57 holes ranging from $3/16''$ to $1\frac{15}{16}''$ dia. — drilled,

tapped or reamed to plug gauge accuracy. Eighty-seven operations are performed, involving many changes of speeds, feeds and spindle locations.

This job which formerly re-

quired 10 hours now shows only 7 hours on the time card. The savings are due to the Super-Service Radial which places every movement of the machine under the immediate control of the operator. Thirty-six speeds, 18 feeds, column clamping, rapid traverse, arm control, compensating dial depth gauge—all of these controls and aids are at the head.



The Super-Service Radial can save money for you, too.

Send for the complete story of this up-to-times Radial.

The SUPER ~ SERVICE Radial

THE CINCINNATI BICKFORD TOOL COMPANY, CINCINNATI, OHIO

Wisconsin State Board of Control, State Capitol, Madison, closes bids April 14 on three 150-hp. boilers, 600-hp. feed water heater, general service pumps, compressor and ash conveyor system for State Industrial School for Girls at Oregon, Wis. John J. Hannan is secretary.

Alfa Machine Co., 1305 North Fourth Street, manufacturer of shears and cutting machines, reports decided improvement in inquiries from New England district and increasing interest in other industrial centers.

Star Metal Products Co., Milwaukee, has leased building at 3033 West Walnut Street and is purchasing equipment for manufacture of general line of stampings, tools, etc.

ST. LOUIS

Benson Brass & Chandelier Works, Inc., 1417 Agnes Street, Kansas City, Mo. E. B. Benson, vice-president, in charge, plans rebuilding two and three-story and basement plant recently damaged by fire. Cost about \$65,000 with equipment.

O. R. Parks, manager, Lambert-St. Louis Municipal Airport, Lambert Field, near St. Louis, is negotiating with company, name temporarily withheld, for erection of aircraft manufacturing plant at local airport.

Airtherm Mfg. Co., 1474 South Vandeventer Avenue, St. Louis, has succeeded to business of Skinner Brothers Mfg. Co., same address, manufacturer of unit heaters, blow-pipe equipment, etc., including machinery and other assets. New organization will continue production for same line and plans expansion for manufacture of dust-collecting systems, etc. Real estate of Skinner company has been purchased by Vandeventer Realty Co., 2084 Main Street, Quincy, Ill.

Bureau of Prisons, Department of Justice, Washington, has revised plans for two-story and basement power house and industrial shop, with mechanical laundry, at Southwestern Reformatory, near El Reno, Okla. Cost about \$145,000 with equipment.

Elaine Utilities Co., Elaine, Ark., Henry H. Thompson, 3891 Galloway Drive, Memphis, Tenn., plans extensions and improvements in power plant, including additional machinery; will also carry out waterworks expansion, with installation of pumping machinery and auxiliary equipment.

Union Oil Co., Seventeenth and Iron Streets, North Kansas City, Mo., has acquired additional property and contemplates new unit at bulk oil storage and distributing plant.

Farmers' National Grain Corp., Grain Exchange Building, Omaha, Neb., has plans for new grain elevator at Kearney, Neb., with elevating, screening, conveying and other equipment. Cost over \$100,000 with machinery. Unit will be occupied by Farmers' West Central Grain Corp., Kearney.

Common Council, Geneva, Neb., has arranged special election to vote funds and approval for municipal electric light and power plant.

PACIFIC COAST

City Council, San Diego, Cal., authorized A. V. Goeddel, purchasing superintendent, to call for bids for equipment for Diesel engine-operated electric light plant in downtown and harbor districts.

Bureau of Supplies and Accounts, Navy Department, Washington, asks bids until April 19 for one valve refinishing machine (Schedule 7787) for San Diego Navy Yard and 240 vacuum tubes (Schedule 7782) for Mare Island Navy Yard.

B. G. Cooke, Woodlake, Tulare County, Cal., plans rebuilding fruit-packing plant, with installation of conveying and mechanical-handling equipment, recently damaged by fire. Loss over \$100,000 with machinery.

Common Council, Richfield, Utah, has plans for a municipal electric light and power plant. Cost close to \$40,000 with equipment. Clarence Smith, chairman, lighting committee, in charge.

Thimbleberry Quick Freezer Corp., care of D. A. Fingerloft, 616 Johnson Street, Portland, president, plans establishment of plant for manufacture of ice cream freezers.

C. J. Call, Focatello, Idaho, has secured permission from Wyoming Public Service Commission to erect hydroelectric generating plant in Star Valley district, northwestern part of Wyoming, for light and power service in that district. Cost about \$75,000 with transmission line. Company will be organized to carry out project.

Utah Oil Refining Co., Newhouse Building, Salt Lake City, Utah, has plans for extensions and improvements in oil refinery, including

equipment for gasoline production under new process. Cost over \$300,000 with equipment. E. S. Holt, company engineer.

Druwhit Metal Products Co., Los Angeles, has completed a new factory building in Central Mfg. District, for manufacture of commercial and architectural metal window products. About 10,500 ft. of floor space is available in this new development, equipped with a complete installation of modern industrial machinery, according to William Dreusike, president.

INDIANA

Indianapolis Wire Bound Box Co., 1300 Beecher Street, Indianapolis, let general contract to Jacobs Brothers, McComb, Miss., for one-story plant, 150 x 200 ft., at Fernwood, near McComb. Cost over \$50,000 with equipment. Company plans to remove present plant to new location and increase capacity, and also proposes consolidation of plants of Mississippi Plywood Co., and McComb Box Co., recently acquired.

Rutenberg Electric Co., Inc., Marion, manufacturer of electric heating and cooking equipment, is increasing operations, recalling number of employees. Company recently secured order for 1000 electric ranges from American Gas & Electric Co., New York.

Air-Cooled Motor Corp., Marion, has been organized by B. G. Hewitt and O. M. Grawne, Marion, to manufacture automobile engine equipment, parts, etc.

Lever Brothers, Inc., 161 Broadway, Cambridge, Mass., manufacturer of soaps, washing powders, etc., will soon begin superstructure for four-story and basement addition to branch plant at Hammond. Cost over \$400,000 with equipment. Stone & Webster Engineering Co., 49 Federal Street, Boston, engineer.

Venzone Sales & Mfg. Co., 236 East New York Street, Indianapolis, manufacturer of automobile batteries, parts, etc., has leased property at 434-44 South Alabama Street, for expansion and will remove to new location.

CANADA

Airway Electric Co., Toledo, Ohio, plans establishment of plant at Windsor, Ont. Company will operate under name of Airway, Ltd.

Jenkins Brothers, Ltd., 617 St. Remi Street, Montreal, has plans by Ross & Macdonald, architects, Architects Building, Montreal, for a machine shop and plant at Lachine, Que.

W. P. Near, engineer, City Hall, London, Ont., will call for bids soon for sludge pumps, screen press and flume in connection with alterations and additions to east end sewage disposal plant.

FOREIGN

Astri Co., Belgrade, Yugoslavia, oil products, affiliated with Phoenix Oil interests, London, England, plans new oil refinery at Titel, Yugoslavia. Cost over \$500,000 with machinery.

D. Napier & Son, Ltd., Acton, London, England, manufacturer of aircraft engines, parts, etc., is planning early resumption of production of Napier automobiles, following discontinuance of such manufacture for several years. Company was first manufacturer in England of six-cylinder automobiles.

Manager, New Zealand Government Railways, Wellington, New Zealand, asks bids until June 2 for one 15-ton electric-operated overhead traveling crane, one engine lathe, three portable drilling machines, radial and non-radial types, arc welding set and one spindle grinder.

American Thermos Bottle Co., Norwich, Conn., manufacturer of metal thermos bottles, etc., plans early establishment of branch plant near London, England.

Soviet Russian Government, Moscow, Russia, is completing plans for erection of hydroelectric generating plant on Vyg River, Karelia, for service in Leningrad district. Cost over \$2,500,000 with machinery and transmission system. Plans are also under way for a steam-operated electric power plant near Angara, with capacity of 400,000 kw., designed to use coal from Cherkemkovo fields, scheduled for completion in 1934; also for erection of power dams on Anzara and Irkut Rivers for hydroelectric generating plant in same district. Prof. A. Alexandrov is engineer in charge of last-noted project. Cost over \$20,000,000. Amtorz Trading Corp., 261 Fifth Avenue, New York, is official buying agency.

Government of Peru, Lima, is considering bill authorizing President of Peru to form corporation to take over by purchase all oil

refineries and gasoline plants. Bond issue is planned to cover acquisition and to carry out expansion program for several new oil refineries, pipe lines and other work.

Bata, Ltd., Zlin, Czechoslovakia, manufacturer of shoes, plans large rubber plant at Vukovar, Yugoslavia, in conjunction with shoe factory to be built there, for manufacture of line of rubber products, including automobile tires and tubes.

Trade Notes

Chicago Flexible Shaft Co., Chicago, has appointed A. E. Goldie, 561 East 108th Street, Cleveland, as representative of Stewart industrial furnaces in the Cleveland territory.

Reliance Electric & Engineering Co., Cleveland, has established a branch sales office at 703 Bona Allen Building, Atlanta, in charge of Marshall Whitman and George Gardner, to serve North Carolina, South Carolina and Georgia.

Dardelet Threadlock Corp., 120 Broadway, New York, has licensed American Screw Co., Providence, R. I., and Western Screw Mfg. Co., Chicago, to manufacture and sell bolts, nuts and screws threaded with the Dardelet self-locking thread.

Wallace & Tiernan Co., Inc., Newark, N. J., through its Canadian subsidiary, Wallace & Tiernan, Ltd., has leased factory space in Toronto for manufacture of water purifying and flour milling equipment.

M. N. Landay Co., Pittsburgh, dealer in iron and steel scrap, rails and equipment, has removed its offices from the First National Bank Building to 1304 Clark Building.

Babcock & Wilcox Tube Co., Beaver Falls, Pa., has established a branch office in the Ford Building, Detroit, in charge of J. E. Polhemus, formerly assistant vice-president and Detroit district sales manager, Associated Alloy Steel Co., Cleveland.

Siewek Tool Co., Detroit, has established a branch office with F. C. Danneman Co., 173-175 Lafayette Street, New York.

Geometric Stamping Co., Cleveland, has published a 28-page reference book, illustrated profusely with charts, graphs and tables, incorporating briefly some of the technical data required by users of pressed metal stampings.

Horace T. Potts & Co., East Erie Avenue and D Street, Philadelphia, have been appointed warehouse distributor in the Philadelphia district for boiler tubes manufactured by Bethlehem Steel Co.

Holo-Krome Screw Corp., Hartford, Conn., has been licensed by the Dardelet Threadlock Corp. to manufacture and sell socket head cap screws, hollow set screws, and countersunk pipe plugs threaded with the Dardelet self-locking thread.

New Trade Publications

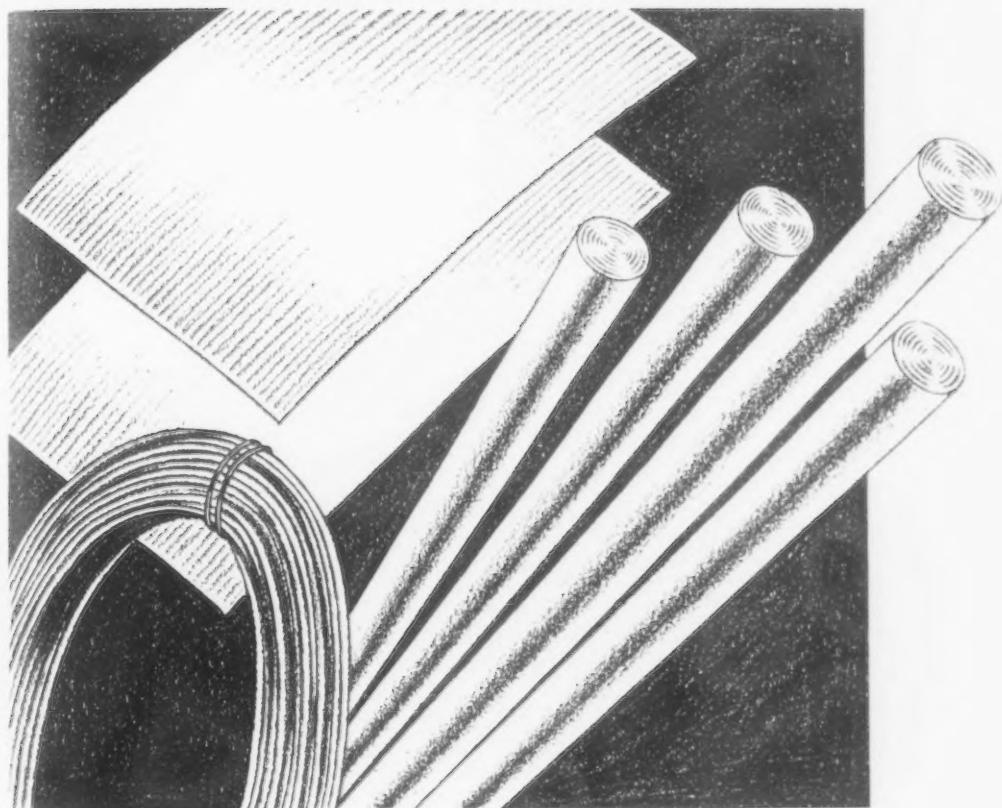
Power Drive Equipment.—Hill Clutch Machine & Foundry Co., Cleveland. Catalog No. 29-A, devoted to bearings, shafting and couplings. Description of the Cleveland type oil-film bearing, made in all styles of rigid and ball and socket mounting, is included, and shafting, collars, shaft couplings, jaw clutches and many styles of bearings for vertical, horizontal and agitator drives are described and illustrated. Dimensions, list prices and useful engineering data are included.

Milling and Boring Machines.—Ingersoll Milling Machine Co., Rockford, Ill. Circular illustrating two openside milling and boring machines built for machining large machine tool castings.

The latest United States Navy methods salt-spray equipment for determining corrosion resistance is discussed in Bulletin 1506, issued by American Instrument Co., 774 Girard Street, N. W., Washington.

Surface Combustion Corp., Toledo, Ohio, has received an order for a continuous gas carburizing furnace, employing the eutectrol process, to be installed at Chrysler Motor Corp.'s Newcastle, Ind., plant for carburizing free wheeling shafts.

SEYMOUR PHOSPHOR BRONZE



SEYMOUR high quality, maintained for more than fifty years, is no accident—it's the result of painstaking endeavor and constant check-ups on grade and accuracy. It's a strenuous business, maintaining the standard that this Company has set for itself, but the confidence of the world's leading producers in the excellence of Seymour Phosphor Bronze Wire, Rods and Sheets is ample reward.

Make your material buying an investment, not a risk. Seymour Phosphor Bronze for every purpose, to exact specifications, is your challenge to 1932.

The SEYMOUR MANUFACTURING CO.

SEYMOUR

1878-1932

CONNECTICUT

SEYMOUR NICKEL SILVER and PHOSPHOR BRONZE
Sheets — Wire — Rods — Also Nickel Anodes — Cast or Rolled



Crooked Core Makes Straight Pipe

(Concluded from page 827)

supported at each end by an ingenious flexible connection, which, at the same time, forms a rigid support against lateral and vertical movement of the ends of the knife. The crank, which rotates the core, also rotates a shaft which extends to a point directly beneath the center of the arbor. On the end of this shaft is a circular eccentric cam. A roller engages this cam and is connected to a push rod which in turn is attached to the center of the core knife. Rotation of the cam pushes the knife upward and a counteracting spring pushes the knife downward. This arrangement of the mechanism automatically compensates for wear and lost motion.

An enlarged view of this deflecting mechanism is shown in Fig. 2. The camshaft revolves at the same speed as the core. The center of the core knife has a harmonic motion toward and away from the arbor. Since the knife forms the core, the result is a crooked or deflected core on a straight arbor. The deflection of the core is greatest at the middle and is nothing at the ends. The amount of the deflection is fixed by the throw of the cam and is adjustable. The core is set in the mold with the deflection downward. When the iron enters the mold the core arbor bends upward and the core is straight.

The deflection necessary varies somewhat but in no size exceeds 0.060 in. This, however, is sufficient to make a pipe $\frac{1}{8}$ in. thicker on one side. Such pipe would not be useful to industry.

The thickness of the layer of sand on the arbor varies in the different sizes from about $5/16$ in. to about $\frac{1}{8}$ in. This also has its effect on the action of the core. The first iron enters the bottom of the mold and lies adjacent to the lower surface of the core. If the layer of sand is too thin, the bottom of the arbor is heated first and is pulled downward. Standardized time for pouring removes this variable. Ladle men easily pour at a rate which varies only one second from the standard.

Upsetting of Arbors Overcome

Another difficulty presented itself and furnished food for thought over a considerable period. The arbors bear in the flasks in turned grooves. Sufficient endwise clearance was allowed to permit expansion, but it was noticed that occasionally arbors were found to be so short that the grooves would no longer register with the finished pads in the flasks. It

was known that the arbors got very hot but no metallurgical reason could account for their gradually diminished length when cold. It was finally discovered that the clamps being used to hold the arbors in place sometimes refused to allow them to move endwise as they expanded. A few clamps were found to be badly bent. The explanation was that the arbors upset themselves. A small alteration in the clamps eliminated the short arbors.

Fig. 3 shows the results obtained in an attempt to arrive at the maximum temperature reached by the arbor. Pouring started at zero time and finished in 10 sec. Readings on the expansion of the arbors were

taken from dial gages at each end of the arbor. The curve shows the sum of the two readings. Dials were supported independent of the flasks. The maximum temperature reached by this arbor was about 1400 deg. F. At one minute the temperature of the arbor was about 420 deg. F. It is known that the iron is set within one minute, so no lateral movement of the core takes place afterward.

Each length of pipe is tested for uniformity of wall by an induction coil which was described in THE IRON AGE, Sept. 17, 1931. Rejections for this cause are negligible.

Fig. 4 shows a flask for casting pipe 16 ft. long. Experimental runs with this equipment demonstrated that the difficulties of casting larger sizes in this manner were no greater than were encountered with the 5-ft. lengths of small pipe.

Rustless Steel and Chromium

Used in Outdoor Advertising

OUTDOOR advertising signs of ordinary painted steel sheets are not unusual, as sheet steel sign boards have been increasingly used for some years. Recently, however,

steel sheets of the Allegheny Steel Co., Brackenridge, Pa.

In Chicago, a similar Wrigley sign has been erected on which the reflecting letters behind the Neon lights



the adoption of Neon lamps for night advertising displays has developed a demand for corrosion-resistant metal with high reflective quality. In consequence, the General Outdoor Advertising Co. has fabricated and erected 11 large-scale signs in New York for the William Wrigley Jr. Co., using rustless steel for the letters of the "Wrigley" name, so that maximum reflection will be obtained for the Neon tubing illuminating it.

The signs vary in size, with the largest 68 ft. long and 35 ft. in height. The polished rustless steel letters of the Wrigley name on this sign are 7 ft. 6 in. high and the faces are from 9 to 24 in. wide, fabricated from No. 24 gage chrome-nickel alloy

of the company name are fabricated of chromium-plated copper sheets, $1/32$ in. thick, and made by the American Nickeloid Co., Peru, Ill. This chromium-plated copper is said to be sufficiently weather-resistant to meet outdoor advertising requirements, the chromium surface remaining bright for a considerable period.

Tyson Roller Bearing Corp., Massillon, Ohio, has published the second edition of a file size, loose-leaf, engineering manual, containing information relating to application of Tyson cageless tapered roller bearings for anti-friction purposes. The manual is available to production, operating and design executives, engineers and superintendents.



PRECISION WELDING —NOW MUREX CONTROL MAKES IT POSSIBLE

Give a welder a Murex Electrode and you give him a new control over welding which banishes old uncertainties and makes welding a dependable, precision operation. Q A Murex Electrode doesn't "pass the buck" to the operator, and as soon as he strikes an arc with Murex, the difference is apparent. The arc is quiet, almost noiseless, held short with ease by "riding" the electrode on the work. There are no objectionable fumes or smoke. Vaporization and spattering are negligible. There is a steady, maximum deposit of strong, ductile metal in a smooth bead or a clean, round fillet, free from undercutting. Q It's the heavy, all-mineral coating on Murex which makes the difference. And that coating, which is held fast to the core by a patented asbestos spiral winding, is proof against moisture and shock. It is not injured when the electrode is bent. Under the arc, the coating creates a free-flowing, visible slag which blankets, levels, and protects the deposit, and which chips off as easily as a thin film of glass. Q Murex Electrodes are made 18 inches long in a variety of types . . . for welding commercial mild steel, manganese steel, 18-8 stainless, and other metals. Write for complete information.

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What Is Ahead in Wire Drawing

(Concluded from page 821)

pear to let the acid work on the rich oxides lying next to the surface of the steel and at the same time greatly retard action on the metal itself.

Electrolytic cleaning, said he, is by no means out of the picture. "It may surprise us at any moment."

Mr. Lewis suggests that we may find a practical way to cool rods in a neutral atmosphere and thus we would not be receiving rods more or less covered with scale. "More than that," he continued, "we may find ourselves dealing with iron that has never felt heat." He referred to the electrolytic deposition of iron from an acid solution of the ore, a development likely to secure its chief impetus in countries possessing large iron deposits and abundant water power but no coal.

The liming process, and baking and galvanizing, were also discussed. Mr. Lewis holds that the lime coat is not necessarily the last word, although, he agreed, it is hard to foresee anything cheaper and more effective. "We must remember, however," he continued, "that it is only a carrier for lubricant and we may find some lubricant that will not need a carrier.

Baking May Some Day Be Unnecessary

"Baking is a process which, historically speaking, is in its infancy. We started sixty or seventy years ago with open fires in the chamber with the rods. Then we built a separate firebox and ran hot flues through the baker. Then we vented the baker to get a circulation through the wire bundles. We have acknowledged by these developments that the essential is a movement of hot air through the rods. The next logical step is the introduction into the baking chamber of air preheated elsewhere at better economy. This is actually coming over the horizon now. There is some evidence that a steady supply of preheated air may permit satisfactory baking at lower temperatures. The purpose of baking is to drive out occluded hydrogen and to roughen the surface of the lime by driving off its water quickly. If we ever stop using mineral acids and lime, we will stop baking.

Complete Revolution in Galvanizing Prophesied

GALVANIZING has some distance yet to go. Success still depends too much on personnel. Personal experience counts too much

and technical data too little. While it is nominally a continuous process, the exhaustion, testing and renewal of the acid, flux and spelter baths are periodic, and results are far from uniform. Zinc bonds beautifully with iron if you get it hot enough, but unfortunately it bonds with the kettle as well as with the wire.

"The solubility of iron in zinc varies very delicately with temperature. In a range of less than 20 deg. F., the time required for the complete destruction of a 1-in. thick kettle wall is at one end of the range, 28 days, at the other end 400 years. When we push through the zinc bath three tons of cold steel an hour, and heat it through a 1-in. thick kettle wall, the wonder is that we make even our present records. It must be remembered that each pound of iron dissolved off the kettle ruins 7 lb. of zinc.

"The distressing thing about this struggle is that these tons of cold steel, to heat which we are forcing the kettle to such a dangerous degree, have within the past few seconds been heated to redness and artificially cooled, whereupon we heat them again in the most dangerous and expensive way imaginable. Does it not seem logical that the steel, once heated, should be introduced into the spelter at once, carrying with it the heat needed for its bonding, and even an excess to cover radiation losses?

Wire to Carry Heat for Its Own Galvanizing

"We ought to cool the kettle, instead of heating it, and the kettle should hold not 15 to 20 tons of zinc, but just enough to 'wet' the wire. I concede the mechanical difficulties, but they seem trifling compared with others that the wire industry has surmounted, and in view of the large stake and the unsatisfactory nature of the current practice and product, I do not know what is detaining our inventors.

"I predict without hesitation that we shall live to see a complete revolution in galvanizing, and that it will be along the line of getting the wire into the spelter cleaner and hotter, and arranging in some way to have the wire convey heat to the spelter."

That materials handling will get an increasing amount of attention is another contention of Mr. Lewis, who long has been an advocate of

large bundles, as typified in the wire mills of the Sheffield Steel Corp., Kansas City, in the design of which he had a major part. "The cost of converting rods to wire consists of about 15 per cent material, including acid, lime and lubricants; about 15 per cent power and about 70 per cent handling. This includes, of course, the wire drawing labor which when you analyze it is nothing but handling. Savings made in handling in the wire room by increasing unit weight can be duplicated over and over in the finishing departments, for in every finishing operation on wire the output per man is largely, if not wholly, limited by the frequency of servicing operations, which tie right back to the wire bundle as a unit."

Going back to the question of drawing, Mr. Lewis in a final word suggested that some means may be found to control the size of crystals and the alignment of their slip planes. "It is known," he said, "that if a unit of metal can be induced to take the form of a single crystal, amazing things can be done with that crystal. I do not dare to say that the wire rod may not some day consist of a single crystal.

X-ray Studies May Prove Helpful

"At any rate, a beginning has been made through X-ray studies of diffraction patterns of crystals in cold worked materials. There is general agreement that plastic flow in crystalline materials proceeds through a series of slips on the cleavage planes of such crystals as have these planes favorably oriented with respect to the direction of the stresses. Cold drawing tends to bring crystals into a preferred orientation. Annealing restores a random orientation. Whether some combination of cold work and heat treatment can be devised to improve progressively the alignment of crystals we do not know, nor do we know whether such treatment would make wire drawing easier or the reverse; but at least we seem to have in the X-ray technique a possible yardstick to measure our progress. One thing must be done by the X-ray enthusiasts—their work must be made intelligible to the layman. If my own struggles with their data are a criterion this will be one of their last accomplishments."

American Institute of Weights and Measures, 33 Rector Street, New York, has published a compilation of the status of measurement standards, arranged in dictionary form by name of unit, and supplemented by recommendations regarding the future of standards for the mechanical, electrical and chemical industries.

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